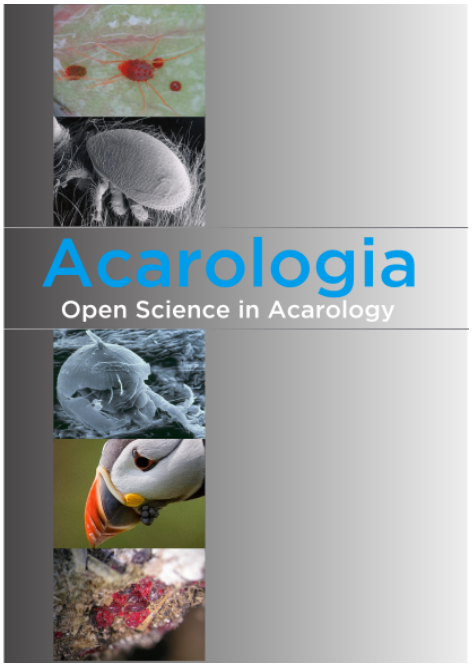

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Phytoseiidae of La Réunion Island (Acari: Mesostigmata): three new species and two males described, new synonymies, and new records

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Original research

ABSTRACT

The Indian Ocean includes several Islands and Archipelagos and a survey of the fauna of Phytoseiidae was realized recently in these poorly known territories, despite La Réunion Island is located in an area being a hotspot of biodiversity. The Phytoseiidae fauna of La Réunion Island has been poorly investigated so far with only 33-recorded species including 24 Amblyseiinae, 5 Phytoseiinae and 4 Typhlodrominae, among which 8 species that had been described as new. All data concerning La Réunion have been published in nine papers until now. New results of surveys done recently (2015-2018) are presented in this 10th paper and add 19 newly recorded species among which 3 are new to Science and 21 already known species but with additional data. Among these 19 species, at least nine are already well known as biological control agents (BCA). Demonstration of the natural occurrence of already known efficient BCA in these territories is consequently of great agricultural and commercial interests, in addition of the contribution to fundamental knowledge of biodiversity of these poorly known territories.

Keywords survey; Phytoseiidae; collection; taxonomy; systematics; La Réunion Island
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Introduction

Several species in the family Phytoseiidae are important natural enemies of phytophagous mite and small insects in natural habitats, outdoor and protected crops all around the world (McMurtry and Croft 1997; McMurtry *et al.* 2013). However, despite the huge numbers of faunistic surveys carried out for more than 60 years, the fauna of some countries and particular ecosystems remain little explored. Consequently, it is important to survey phytoseiid faunas in poorly known areas in order to document the biodiversity of these areas, especially in biodiversity hotspots, as well as to discover new potential biological control agents (BCA). This is especially important given the context of new international and state regulations concerning import-export of BCA (Kreiter *et al.* 2020a, b).

The family Phytoseiidae is widespread all over the world and consists of 2,521 valid species dispatched in three sub-families and 94 genera (Demite *et al.* 2019).

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Several terrestrial areas of the Indian Ocean constitute one of the world's hotspots of biodiversity. Myers (1988) defined the hotspot of biodiversity concept in order to identify the areas of biodiversity in most urgent need of conservation/protection. These world hotspots are characterized by high levels of endemism and have lost at least 70 % of their original natural vegetation (Myers *et al.* 2000). The characterization of the phytoseiid mite diversity in these areas is thus contributing to this general topic of conservation. Located in the Indian Ocean at 700–800 km from the Eastern coast of Madagascar, La Réunion is the main island of the Mascareignes Archipelago (with the two other main islands being Mauritius and Rodrigues).

Ueckermann and Loots (1985) published the first paper concerning Phytoseiidae of La Réunion Island 35 years ago. It concerns a description of a new species to Science, *Phytoscutus reunionensis* (Ueckermann and Loots) found on *Prunus persica* (L.) in La Plaine des Cafres in 1983 by Dr Serge Quilici (Ueckermann and Loots 1985). In a study of the Tetranychidae and their predators, Guttierrez and Etienne (1986) mentioned two species of Phytoseiidae for La Réunion, *Euseius ovaloides* (Blommers) and *Phytoseiulus persimilis* Athias-Henriot, the last probably escaped in the neighbouring areas of greenhouses after releases. Quilici *et al.* (1988) mentioned then two species on litchi (*Litchi chinensis* Sonn.) in Bassin-Martin CIRAD research station, *Amblyseius largoensis* (Muma) and *E. ovaloides*, bringing to four the number of known species. In a further study focussing on mites of various crops of the Island, Quilici *et al.* (1997) mentioned six additional species and Quilici *et al.* (2000) added 14 species recorded for the first time in La Réunion. Just after, Kreiter *et al.* (2002) described seven new species from the Island, bringing to eight the number of new species described and to 31 the total number of species recorded from this island. Only one was collected in another place after its description, *Typhlodromus* (*Anthoseius*) *moraesi* Kreiter and Ueckermann, very far from La Réunion, in Guadeloupe and then also in Martinique, both in the Caribbean (Kreiter *et al.* 2013, 2018c). Moraes *et al.* (2012) added another species for La Réunion, *Neoseiulus recifensis* Gondim Jr. and Moraes, originally described from Brasil. Surprisingly, this species was found in samples from a survey for selection of a BCA against *Raoiella indica* Hirst in Brazil, along with two other common species, *A. largoensis* and *T.* (*A.*) *moraesi*. Finally, Kreiter *et al.* (2016a, b) mentioned the unexpected occurrence of *Amblyseius swirskii* Athias-Henriot in La Réunion, never collected and mentioned in previous studies, collected suddenly in high population in 2015 and 2016, bringing to 33 the number of the known species present in La Réunion Island.

We report in this 10th paper on La Réunion phytoseiids the results of additional surveys conducted from 2015 to 2018.

Material and methods

The survey took place in La Réunion Island in 2015, 2016, 2017 and 2018. Plant-inhabiting mites were collected from various cultivated and wild plants in various locations of La Réunion. Mites were directly collected on leaves with a fine brush or by using the leaf "dipping-shaking-washing-filtering (dswf)" method of Boller (1984) or by beating the plants (mainly shrubs or trees) and collecting the mites in a black plastic rectangular saucer 45 x 30 cm (Ref. STR 45, BHR, 71370 Saint-Germain-du-Plain, France). The method selected was dependent on the plant investigated: large leaves of shrubs and trees were sampled using the direct collection method or with dswf; small leaves of shrubs and trees with the dswf or by beating and herbaceous plants with dswf.

An experiment was conducted at the Bassin-Plat CIRAD Research Station, Saint-Pierre, in La Réunion Island (altitude above sea level = aasl: 153 m, 55°29'18" E; 21°19'25" S). The experimental site was a 0.3 ha citrus orchard (*Citrus sinensis* x *C. reticulata* cv. Tangor grafted on Citrange Carrizo) with 149 meters spaced trees planted in March 2012, after a 2-year spontaneous fallow. Tree rows were planted six meters apart. The wet season spans from November to April and the dry season from June to October. The local average annual

precipitation for the period 2014 to 2016 was 1025 mm. From March 2012 to February 2014 (before the experiment started), weeds around the tree base and within 50-cm radii around them were controlled with the herbicide glyphosate (360 g.L-1 and 4 L.ha-1). Weeds in the 5-m-wide area between rows were controlled with a hammer mill.

The experiment began in March 2014. We used a complete bloc design with six replicates to test the effects of different weed management methods on the composition of the ground cover plant community. Four weed management treatments were compared: tillage (**T**), mowing (**M**), hammer mill (**HM**), and herbicide (**H**). These four treatments were distributed haphazardly within each replicate (four plots of 13 m x 5 m). Mowing and herbicide-spraying treatments were carried out in the same inter-rows so that they would not be disturbed by the tractors used for tillage or hammer mill. Hammer mill is the most commonly used engine for weed management in citrus orchards on the Réunion Island. Mowing was done with an adapted hedge-trimmer, which cuts up weeds at 10 cm above ground. A hammer mill [SML 155 SEPPI®, Caldaro (Bolzano), Italy] was used to crush weeds at the soil level. The herbicide treatment using glyphosate (360 g.L-1 at 4 L.ha-1) eliminated all weeds. A disk harrow (Grégoire and Besson®, Montigné-Montfaucon, France) was implemented once or twice in order to destroy the maximum of weeds. Weed management activities were activated when the ground cover was estimated by a farmer as being too high (70 to 80 cm height for at least one treatment). The timing for treatment was the same for all four treatments, and their timing was spaced out by a period of 93 + 27 days (mean ± SD) depending on the season.

Plots with different weed management (weed communities are variable in space and time and it is impossible to give a precise list of weed species for each date of sampling) were sampled in order to collect arthropods, including phytoseiid mites. Mites collected were then transferred with a brush into small plastic vials containing 70 % ethanol. Mites were then all mounted on slides using Hoyer's medium and identified using a phase or interferential contrast microscope (DMLB, Leica Microsystèmes SAS, Nanterre, France). Characters of specimens were measured using a graduate eyepiece (Leica, see above). We used Chant and McMurtry's (1994, 2007) concepts of the taxonomy of Phytoseiidae and the world catalogue database of Demite *et al.* (2019) for faunistical and biogeographical aspects. Only females were measured unless males were available. Immature will be measured and described in another paper.

In the (re)description of species, the setal nomenclature system adopted was that of Lindquist and Evans (1965) and Lindquist (1994), as adapted by Rowell *et al.* (1978) for the dorsum and by Chant and Yoshida-Shaul (1991) for the venter. The idiosomal setal pattern follows Chant and Yoshida-Shaul (1992). The notation for gland pores (solenostomes) or lyrifissures (poroids) is based on Athias-Henriot (1975).

Measurements of the main morphological characters were made as follows: dorsal shield length from the anterior to posterior shield margins along the midline; width between lateral margins at the level of setae *s4*; length of genital shield from the anterior margin of hyaline surface to the posterior margin of the shield; width of genital shield as the distance at the level of setae *st5* and between posterior corners of the shield; ventrianal shield length as the distance between anterior and posterior margins; ventrianal shield width between insertions of *ZV2* and at level of anus, of paranal setae between margins of the shield; cheliceral movable digit length was measured from basal articulation to tip of the digit; the fixed digit from the dorsal lyrifissure to the tip. Numbers of teeth on the fixed and movable cheliceral digits do not include the respective apical hook. Setae not referred to in the Results section should be considered as absent.

All measurements are given in micrometers (µm) and presented as the mean in bold followed by the range in parenthesis. New measurements for holotypes and paratypes of already described species are presented in tables in bold and underlined. Specimens of all species are deposited in the mite collections of Montpellier SupAgro conserved in UMR CBGP INRA/IRD/CIRAD/SupAgro. Specimens collected in fields in La Réunion within this survey were all identified. Very few single males collected alone within this study were not taken into account.

The following type or additional material have been borrowed and studied:

- The holotype of *Neoseiulus houstoni* (Schicha), from the reference collection of the Biosecurity Collections (NSW [= New South Wales] Department of Primary Industries), Orange NSW, Australia;
- The holotype, one paratype and additional material of *Neoseiulus recifensis* Gondim Jr and Moraes, housed in the mites reference collection of the Department Entomology and Acarology, Escuela Superior de Agricultura Luiz des Queiroz (ESALQ), University of Sao Paulo (USP), Piracicaba, Brasil.

We have also examined type specimens of *Amblyseius longipilus* Kreiter and Ueckermann (the holotype and 10 paratype females), *eckermannseius nesiotus* Ueckermann and Kreiter (one paratype female), *Phytoseius haroldi* Ueckermann and Kreiter (three paratype females), and *Neoseiulus barreti* Kreiter (one paratype female) of the mite collections of Montpellier SupAgro conserved in UMR CBGP, in order to complete descriptions and compared to specimens collected during this study.

The following abbreviations are used in this paper for morphological characters: **dsl** = dorsal shield length just under *j1* to just below *J5*; **dsw** = dorsal shield width at the level of *s4*; **Per. ext.**: peritreme extension; ***gd*** = solenostome; ***Z4* ser.**, ***Z5* ser.** = *Z4*, *Z5* serrated (if *Z4* and *Z5* without ser. = not serrated); **knob.** = knobbed; **gensl** = genital shield length; **gensw *st5*** = genital shield width at the level of setae *st5*; **gensw post. corn.** = genital shield width between posterior corners; **lisl** = largest inguinal sigilla (= "metapodal plate") length; **lisw** = largest inguinal sigilla (= "metapodal plate") width; **sisl** = smallest inguinal sigilla (= "metapodal plate") length; **vsl** = ventrianal shield length; ***gv3*** = solenostome on ventrianal shield; ***gv3* dist.** = distance between pre-anal solenostomes on the ventrianal shield; **vsw *ZV2*** and **vsw anus** = ventrianal shield width at *ZV2* level and at paranal setae level; **asl** = anal shield length; **acw** = anal shield width at the level of paranal setae; **scl** = total spermatheca length (calyx + neck or cervix + atrium); **calyx l.**: calyx length; **scw** = calyx largest width; **FD** = fixed digit; **Fdl** = fixed digit length; **MD** = movable digit; **Mdl** = movable digit length; **Nb teeth Fd** = number of teeth on the fixed digit; *Nb teeth Md* = number of teeth on the movable digit; **Shaft** = length of the shaft of spermatodactyl. We also used the following abbreviation: **im.** = immatures; **BCA** = Biological control agents; **FCI** = French Caribbean Islands; **VCW**: various countries in the world.

The following abbreviations are used in this paper for institutions: **CBGP** = Centre de Biologie pour la Gestion des Populations; **CIRAD** = Centre International de Recherche Agronomique pour le Développement; **INRA** = Institut National de la Recherche Agronomique; **IRD** = Institut de Recherche pour le Développement; **MSA** = Montpellier SupAgro, France; *UMR* = Unité Mixte de Recherche; *UPR* = Unité Propre de Recherche, **Hortsys** = Name of the CIRAD research unit o Agroecology functioning and performances of horticultural systems ; **PVBMT** = Plant Populations and Bio-aggressors in Tropical Ecosystems Joint Research Unit from University of La Réunion Island, CIRAD and INRA; **NSW** = New South Wales; **ESALQ** = Escola Superior de Agricultura Luiz de Queiroz; **USP** = Universidade de São Paulo.

Results and discussion

A total of 44 species were found from the beginning of 2015 to the end of 2018 in our surveys.

- Four species were already well-known in the literature, very common in La Réunion and already recorded; *A. largoensis* was commonly found in the near past in different localities (Moraes *et al.* 2012) and several hundred specimens of this species as well as of the next species (see below), *A. swirskii*, were collected; *A. swirskii* (see Kreiter *et al.* 2016a) of which ten females and five males were measured.; *E. ovaloides* (mentioned in Quilici *et*

al. 1997, 2000), not measured in the present paper but this species has very characteristic features and is probably the most common species in La Réunion Island. Five hundred specimens were collected in the present study and everywhere in the Island; *T.* (*Anth.*) *moraesi* (see Kreiter *et al.* 2002), for which only eight females and one male collected in La Réunion were measured. This species is very characteristic and very common on weeds and low plants where several hundred specimens were collected during this study, mainly in experimental plots of Bassin-Plant CIRAD Research Station. Several specimens of this species was previously measured in the Caribbean islands (Kreiter *et al.* 2013, 2018c) and measurements of specimens of La Réunion agree well with measurements of these Caribbean specimens. These four species are very common and widespread in the island. Measurements of individuals of these four species are very largely overlap with those of original descriptions and of measurements published in other studies.

For the remaining 40 species, we give measurements and details in this paper:

- Nineteen have been already mentioned in previous papers (Quilici *et al.* 1997, 2000; Kreiter *et al.* 2002; Moraes *et al.* 2012) but they are rare and their occurrence have been given without any measurements which are still very interesting for further identifications: *Neoseiulus arkeri* Hughes, *N. bayviewensis* (Schicha), *N. scapilatus* (van der Merwe), *N. teke* (Pritchard and Baker), *Paraphytoseius orientalis* Narayanan, Kaur and Ghai, *Phytoseiulus persimilis* Athias-Henriot, *Scapulaseius reptans* (Blommers), *Amblyseius herbicolus* (Chant), *A. tamatavensis* (Blommers), *Proprioseiopsis mexicanus* (Garman), *Typhlodromalus spinosus* (Meyer and Rodrigues), *Ueckermannseius nesiotus* (Ueckermann and Kreiter), *Euseius hima* (Pritchard and Baker), *Phytoseius amba* Pritchard and Baker, *P. crinitus* Swirski and Shechter, *P. haroldi* Ueckermann and Kreiter, *P. intermedius* Evans and MacFarlane, *Kuzinellus scytinus* (Chazeau), *Typhlodromus* (*Anthoseius*) *transvaalensis* (Nesbitt).

- For one species, *A. longipilus*, 14 females have been measured in the original description of Kreiter *et al.* (2002) which is considered enough for a good estimate of the specific variability (Tixier 2012). Some character measures were however lacking in this original description and we provide here additional/complementary data on the species.

- For one species already known from the Island, *N. recifensis*, we were suspecting a synonymy with two other similar species of *Neoseiulus (N. barreti* and *N. houstoni*). These three species are compared thereafter and the male of one of this species is described for the first time.

- Seventeen species are new for the Island, namely: *Neoseiulus baraki* (Athias-Henriot), *N. californicus* (McGregor), *N. houstoni*, *N. longispinosus* (Evans), *N. lula* (Pritchard and Baker), *N. paspalivorus* (De Leon), *Paraphytoseius horrifer* (Pritchard and Baker), *Typhlodromips culmulus* (van der Merwe), *Transeius soniae* Zannou, Moraes and Oliveira, *Amblyseius neoankaratrae* (Ueckermann and Loots), *Proprioseiopsis ovatus* (Garman), *Ueckermannseius parahavu* Moraes, Zannou and Oliveira, *Amblydromalus nakuruensis* Moraes, Zannou and Oliveira, *Phytoseius punicae* Chinniah and Mohanasundaram, *P. woodburyi* De Leon, *Platyseiella eliahui* Ueckermann, *Typhlodromus* (*Anthoseius*) *ndibu* Pritchard and Baker. The male of *A. neoankaratrae* was previously unknown and is herein described.

- And finally, *three* species are new to Science, one belonging to the genus *Amblyseius* and two belonging to the genus *Transeius*. These three species are described in this paper.

All results concerning locations, measurements and some biological details for the 40 species are given thereafter.

Subfamily Amblyseiinae Muma

Amblyseiinae Muma, 1961: 273.

Tribe Neoseiulini Chant & McMurtry

Neoseiulini Chant & McMurtry 2003a: 6.

Genus *Neoseiulus* Hughes

Neoseiulus Hughes, 1948: 141.

Neoseiulus baraki (Athias-Henriot)

Amblyseius baraki Athias-Henriot 1966: 211.
Amblyseius (*Amblyseius*) *baraki*, Ehara & Bhandhufalck 1977: 54.
Amblyseius (*Neoseiulus*) *baraki*, Gupta 1986: 104.
Neoseiulus baraki, Moraes *et al.* 1986: 70; Chant & McMurtry 2003a: 27; Moraes *et al.* 2004a: 149; 2004b: 104; Zannou *et al.* 2006: 248; Chant & McMurtry 2007: 25.
Amblyseius dhooriai Gupta 1977: 30 (synonymy according to Gupta 1986).

This species belongs to the *paspalivorus* species group of the genus *Neoseiulus* as the female ventrianal shield is large, rectangular, rounded posteriorly, and the dorsal shield has marked "shoulders" at the level of setae *r3* (Chant and McMurtry 2003a). *Neoseiulus baraki* is a Mediterranean and subtropical species often found on monocotyledonous plants, and mainly on Poaceae. It is also a predatory mite associated with the coconut mite *Aceria guerreronis* Keifer in many parts of the world (Moraes *et al.* 2004b; Lawson-Balagbo *et al.* 2008). It is known to disperse from herbaceous weeds to the coconut "trees". It has a flattened idiosoma with a small cross-sectional diameter (Moraes *et al.* 2004b), which enables it to reach the area underneath leaf bracts where the coconut mite feeds. Moreover, it shows a strong temporal relationship with the abundance of the coconut mite on palms (Fernando *et al.* 2003). Hence, *N. baraki* is considered a potential BCA against the coconut mite. However, in nature they are unable to maintain the coconut mite populations below the expected economic levels and so, additions of *N. baraki* to the environment to supplement natural populations for controlling the coconut mite has been considered. An essential pre-requisite to field augmentation is an effective mass rearing method. Use of coconut mites to mass rear *N. baraki* in the laboratory is expensive and time consuming. Eggs of *Tetranychus urticae* Koch, coconut pollen and maize pollen were found to be suitable alternative foods for rearing *N. baraki* but it can be more easily reared on *Tyrophagus putrescentiae* Shrank, which can be easily reared on cheap supports issued from agricultural products transformation.

This is the first mention of the occurrence of this species in La Réunion Island, the first mention in the Indian Ocean and the second mention from Sub-Saharan Africa *sensu lato*, in addition to Zannou *et al.* (2006).

Specimens examined: 16 ♀♀ + 8 ♂♂ in total, 12 ♀♀ + 5 ♂♂ measured. Saint-Pierre - Bassin-Plat CIRAD Research Station (altitude above sea level = aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 2 ♀♀ + 1 ♂ on *Melinis repens* (Willd.), 20/2/2017; 6 ♀♀ + 3 ♂♂ in **CC** (Cover crop), **HM** (Hammer Mill), and **M** (Mowing) and on *Digitaria ramularis* (Trin.), 20/3, 3 and 6/4 and 20/6/2017; 1 ♂ on *Leucaena leucocephala* (Lam.), 30/03/2017; 3 ♀♀ + 2 ♂ + 1 im. on *Panicum maximum* Jacq., and 5 ♀♀ + 1 ♂ + 6 im. on *Bidens pilosa* L., 20/2, 30/3 and 20/6/2017.

Remarks: The measurements of characters of adult females (Table 1) are similar to those published in the literature, especially with those from specimens of Tanzania, except for the number of teeth on fixed digits of chelicerae that is higher in specimens of Tanzania.

The measurements of adult males (Table 1) are also close to those published, and closest to those obtained from specimens from Tanzania, except for the number of teeth (same remark for females).

Neoseiulus barkeri Hughes

Neoseiulus barkeri Hughes 1948: 141; Chant & McMurtry 2003a: 35; Moraes *et al.* 1986:70; Moraes *et al.* 2004: 104.
Typhlodromus (*Neoseiulus*) *barkeri*, Nesbitt 1951: 35.
Typhlodromus (*Typhlodromus*) *barkeri*, Chant 1959: 63.
Typhlodromus (*Amblyseius*) *barkeri*, Hughes 1961: 222.
Typhlodromus barkeri, Hirschmann 1962: 9.
Amblyseius barkeri, Athias-Henriot 1961: 440; Moraes *et al.* 1989: 95.
Amblyseius (*Amblyseius*) *barkeri*, van der Merwe 1968: 112.
Neoseiulus bakeri, Ryu *et al.* 2001: 8; Chant & McMurtry 2003a: 33; Moraes *et al.* 2004a: 104; Chant & McMurtry 2007: 25.
Amblyseius masiaka Blommers & Chazeau 1974: 308 (Synonymy according to Ueckermann & Loots 1988).
Amblyseius mckenziei Schuster & Pritchard 1963: 268 (Synonymy according to Ragusa & Athias-Henriot 1983).

Table 1 Character measurements of *Neoseiulus baraki* adult females and males collected in this study with those of previous studies (localities followed by the number of specimens measured).

Characters	♀							♂				
	La Réunion 12, this study	**Africa** 7	**Sri Lanka** 21	**Taiwan** ?	**Tanzania** 60	**Thailand** **2**	**Holotype** 1	**La Réunion** 5, this study	**Benin** 20	**Brazil** 20	**Tanzania** 40	**Thailand** **1**
Dsl	**358** (330 – 384)	353 (336 – 365)	350 (330 – 375)	365	361 (348 – 368)	345 – 358	338	**280** (270 – 288)	276 (268 – 282)	288 (282 – 295)	278 (269 – 285)	350
Dsw	**159** (150 – 170)	157 (142 – 168)	160 (146 – 175)	163	162 (158 – 168)	161 – 170	150	**143** (138 – 150)	142 (136 – 143)	149 (146 – 152)	143 (133 – 155)	170
j1	**15** (13 – 16)	15 (10 – 19)	14 (13 – 16)	17	13 (9 – 15)	11 – 15	13	**13**	9 (6 – 10)	13 (9 – 16)	11 (9 – 15)	13
j3	**19** (16 – 20)	15 (13 – 18)	17 (13 – 19)	18	16 (13 – 19)	17 – 19	15	**16** (13 – 18)	11 (9 – 13)	16 (13 – 19)	14 (10 – 16)	16
j4	**12** (10 – 13)	9 (8 – 10)	11 (9 – 12)	11	10 (9 – 12)	11 – 12	11	**9** (8 – 10)	8 (6 – 9)	9 (6 – 9)	9 (6 – 10)	11
j5	**12** (10 - 14)	10 (8 – 11)	11 (10 – 18)	11	9 (6 – 10)	10 – 12	11	**10** (9 – 10)	8 (6 – 9)	9 (6 – 10)	9 (6 – 10)	12
j6	**14** (12 – 15)	11 (8 – 14)	13 (11 – 15)	14	12 (9 – 15)	13 – 15	13	**13** (13 – 14)	9 (6 – 10)	10 (9 – 12)	10 (9 – 13)	13
J2	**13** (11 – 14)	13 (11 – 14)	12 (10 – 13)	13	12 (9 – 15)	13 – 15	13	**12** (10 – 13)	9 (6 – 9)	10 (9 – 12)	10 (10 – 13)	12
J5	**12** (10 – 13)	10 (8 – 11)	11 (10 – 13)	12	10 (9 – 12)	13	11	**10** (9 – 11)	9 (6 – 10)	9 (6 – 9)	8 (6 – 9)	11
r3	**17** (14 – 20)	15 (11 – 18)	15 (13 – 16)	14	16 (12 – 19)	16	16	**15** (13 – 18)	11 (9 – 13)	14 (13 – 16)	13 (9 – 15)	14
R1	**17** (15 – 18)	12 (11 – 14)	13 (12 – 15)	9	16 (13 – 19)	15	10	**13** (13 – 14)	12 (9 – 13)	15 (13 – 19)	12 (9 – 15)	16
s4	**17** (15 – 20)	14 (13 – 18)	16 (14 – 17)	14	16 (13 – 19)	16 – 18	15	**16** (13 – 18)	12 (10 – 13)	20 (16 – 22)	15 (13 – 16)	16
S2	**18** (16 – 19)	16 (11 – 21)	15 (14 – 16)	17	16 (13 – 19	16	15	**16** (14 – 18)	13 (10 – 16)	19 (19 – 22)	14 (13 – 16)	16
S4	**26** (20 – 30)	20 (16 – 29)	25 (23 – 27)	26	27 (22 – 28)	24 – 26	20	**22** (20 – 23)	16 (15 – 19)	20 (16 – 22)	20 (19 – 22)	23
S5	**24** (21 – 26)	25 (19 – 30)	25 (21 – 28)	22	26 (22 – 28)	23	20	**19** (18 – 22)	16 (15 – 19)	19 (19 – 22)	20 (19 – 22)	21
z2	**13** (10 – 15)	11 (6 – 16)	11 (10 – 13)	12	10 (9 – 12)	12 – 13	10	**10**	8 (6 – 9)	10 (9 – 12)	9 (6 – 12)	13
z4	**15** (14 – 16)	13 (11 – 16)	14 (10 – 15)	12	13 (10 – 16)	15	13	**13** (10 – 15)	10 (9 – 12)	11 (9 – 13)	12 (9 – 15)	15
z5	**11** (10 – 13)	9 (8 – 10)	10 (9 – 15)	10	9 (6 – 12)	10 – 12	10	**9** (8 – 10)	7 (6 – 9)	8 (6 – 9)	7 (6 – 9)	11
Z1	**14** (11 – 16)	13 (11--16)	12 (11 – 14)	14	11 (9 – 15)	15	3	**13**	10 (7 – 13)	10 (9 – 12)	11 (9 – 13)	14
Z4	**23** (21 – 28)	13 (18 – 24)	21 (19 – 25)	24	23 (19 – 28)	20 – 24	20	**19** (14 – 20)	16 (10 – 19)	18 (13 – 22)	19 (16 – 25)	20
Z5	**74** (65 – 78)	61 (53 – 67)	69 (60 – 73)	65	76 (70 – 79)	70 – 76	77	**59** (55 – 63)	56 (51 – 63)	60 (57 – 63)	59 (54 – 63)	65
st1-st1	**41** (38 – 43)	-	-	-	-	-	-	**39** (38 – 40)	-	-	-	-
st2-st2	**54** (50 – 58)	54 (51 – 59)	51 (49 – 53)	-	53 (51 – 57)	52 – 53	52	**41** (39 – 43)	41 (38 – 41)	43 (41 – 44)	41 (38 – 44)	-
st3-st3	**59** (56 – 61)	-	-	-	-	-	-	**45** (45 – 45)	-	-	-	-
st1-st3 ♀ / st1-st5 ♂	**87** (84 – 93)	80 (75 – 85)	83 (78 – 87)	-	84 (79 – 89)	80 – 81	80	**125** (123 – 128)	-	-	-	-
st4-st4	**62** (50 – 76)	-	-	-	-	-	58	**33** (31 – 35)	-	-	-	-
st5-st5	**62** (58 – 67)	59 (56 – 62)	58 (55 – 60)	-	61 (57 – 66)	56 – 61	56	**34** (32 – 35)	33 (32 – 35)	36 (34 – 38)	34 (32 – 38)	-
Lisl	**39** (38 – 43)	-	-	41	-	32	-					
Lisw	**5** (4 – 5)	-	-	4	-	-	-			Not applicable		
Sisl	**9** (8 – 10)	-	-	7	-	10	-					
Vsl	**112** (105 – 120)	117 (107 – 125)	112 (88 – 120)	111	116 (111 – 120)	110 – 115	112	**103** (98 – 108)	105 (98 – 111)	110 (104 – 114)	104 (98 – 108)	-
Vsw *ZV2*	**98** (90 – 103)	87 (82 – 93)	87 (71 – 118)	96	101 (95 – 105)	90 – 95	92	**117** (98 – 130)	123 (114 – 130)	127 (120 – 133)	123 (111 – 133)	-
Vsw *anus*	**84** (80 – 88)	86 (77 – 99)	83 (73 – 95)	-	85 (79 – 92)	-	87	**90** (80 – 95)	79 (73 – 85)	89 (85 – 91)	83 67 – 95)	-
JV5	**30** (26 – 32)	-	-	26	-	26	-	**21** (16 – 24)	-	-	-	26
StIV	**39** (34 – 43)	34 (29 – 40)	38 (31 – 42)	42	37 (32 – 41)	35 – 40	35	**36** (33 – 38)	26 (25 – 28)	35 (32 – 38)	31 (25 – 35)	34
Scl	**10** (9 – 13)	12 (11 – 12)	10 (9 – 11)	14	10 (9 – 12)	11 – 12	10					
Scw	**7** (5 – 8)	3	2 (2 – 3)	4	4 (3 – 6)	3 – 5	2			Not applicable		
Fdl	**28** (25 – 30)	25 (25 – 26)	31 (30 – 33)	-	25 (22 – 28)	25 – 28	-	**19** (18 – 23)	13 (13 – 16)	16 (13 – 16)	15 (12 – 19)	-
No teeth Fd	**8**	7	10 – 11	11	10 – 11	8	8 – 9	**4**	-	-	-	8
Mdl	**31** (28 – 33)	21 (21 – 22)	29 (27 – 31)	-	30 (28 – 32)	30 – 31	-	**21** (19 – 25)	18 (16 – 19)	20 (19 – 22)	19 (16 – 22)	-
No teeth Md	**2**	1	2	2	2	1 – 2	2	**2**	-	-	-	1
Shaft			Not applicable					**13** (8 – 18)	9 (6 – 12)	10 (9 – 12)	9 (6 – 10)	-

Sources of measurements – For ♀♀: Africa (Benin 4♀♀, Burundi 1♀ and Kenya 2♀♀): Zannou *et al.* (2006); Sri Lanka: Moraes *et al.* (2004b); Taiwan: Tseng (1983); Tanzania: Famah Sourassou *et al.* (2012); Thailand: Oliveira *et al.* (2012); Holotype from Algeria: Athias-Henriot (1966 in Famah Sourassou *et al.* 2012). For ♂♂: Benin, Brazil, Tanzania: Famah Sourassou *et al.* (2012); Thailand: Ehara & Bhandhufalck (1977). - : not provided.

Amblyseius mycophilus Karg 1970: 290 (Synonymy according to Ragusa & Athias-Henriot 1983).
Amblyseius oahuensis Prasad 1965: 1518 (Synonymy according to Ragusa & Athias-Henriot 1983).
Amblyseius picketti Specht 1968: 681 (Synonymy according to Ragusa & Athias-Henriot 1983).
Amblyseius usitatus van der Merwe 1965: 71 (Synonymy according to Ueckermann & Loots 1988).

This species belongs to the *barkeri* species group of the genus *Neoseiulus*, as the spermathecal atrium is large and forked at junction with major duct. It belongs to the *barkeri* species subgroup as the calyx is not markedly constricted at junction with the atrium, the atrium is deeply forked at the junction with major duct without vacuolated area, and the major duct, atrium and calyx are of approximately the same width (Chant and McMurtry 2003a).

Neoseiulus barkeri has a worldwide distribution (Moraes *et al.* 2004a; Demite *et al.* 2019). Various studies have shown its ability to control *Frankliniella occidentalis* Pergande (Rodriguez-Reina *et al.* 1992), *Thrips tabaci* (Lindeman) (Broodsgaard and Hansen 1992) and *T. urticae* in cucumber (Fan and Petitt 1994b). Fan and Petitt (1994a) showed that augmentative releases of *N. barkeri* provided control of broad mite, *Polyphagotarsonemus latus* (Banks), on peppers. *Neoseiulus barkeri* constitutes a potential BCA for several crops especially in vegetables greenhouses.

This species has been mentioned by Quilici *et al.,* (2000) in La Réunion, with locations listed but without morphological measurements presented. Measurements of specimens collected during this study are provided in the table 2.

Specimens examined: 51 ♀♀ + 2 ♂♂ in total, 15 ♀♀ + 2 ♂♂ measured. St-Pierre - Ligne Paradis, La Coccinelle Inc. (aasl 164 m, Long 55°28'59" E, Lat 21°18'55" S), 5 ♀♀ in rearings of *Proprioseiopsis mexicanus* (Garman), 1/1/2017; Vincendo – Delaunay Jean-Max farm (aasl 110 m, Long 55°67'14" E, Lat 21°38" S), 45 ♀♀ + 2 ♂♂ on *Capsicum annuum* L., 11 and 18/1/2016 and 15/12/2016; Montvert-les-Hauts – EARL Le Mont Vert farm (aasl 582 m, Long 55°32'19" E, Lat 21°19'42" S), 1 ♀ on *C. annuum*, 19/9/2016.

Remarks: measurements of characters of females from La Réunion Island are only slightly different from female specimens from other countries, with less than 10 % differences (Table 2). All setae of specimens from South Africa (Ueckermann and Meyer 1988) are just slightly longer from those from other countries. Measurements of characters of males from La Réunion Island are also slightly different from male specimens from other countries, with < 10% differences (Table 2). In general, setae of specimens from La Réunion appears a bit smaller than those from other African countries but dorsal shied is larger.

Comparisons with *N. barkeri* measurements of female and male (Table 2) specimens of various origins in Beaulieu and Beard (2018) shows shorter dimensions of all characters of La Réunion specimens (all ranges of La Réunion specimens are in the lower parts of the ranges mentioned by these authors). These authors already mention in their paper the shorter dimensions of dorsal setae of African female and male specimens (lower part of observed ranges) compared to their own measurements (Beaulieu and Beard 2018).

Neoseiulus bayviewensis (Schicha)

Amblyseius bayviewensis Schicha 1977b: 394; Schicha 1987: 107.
Neoseiulus bayviewensis, Moraes *et al.* 1986: 72; Quilici *et al.* 1997: 285, 2000: 101; Beard 2001: 97; Kreiter *et al.* 2002: 348; Chant & McMurtry 2003: 21; Moraes *et al.* 2004: 107; Chant & McMurtry 2007: 25.

This species belongs to the *cucumeris* species group of *Neoseiulus* as dorsocentral setae are not as short relative to dorsolateral setae, and the ratio *s4*/*j6* is 1.3 to 3.5. The spermatheca is without a stalk between calyx and atrium, the atrium is differentiated, joined directly to calyx. The species belong to the *cucumeris* species subgroup (Chant and McMurtry 2003a).

This species was only known from Australia for a long time (Demite et al. 2019). Quilici *et al.* (1997, 2000) collected this species on *Hibiscus* sp., associated with populations of the eriophyid *Aceria hibisci* (Nalepa), which is common in La Réunion. However, the biology of this predator remains unknown.

Collection data were provided in previous papers (Quilici *et al.* 1997, 2000) but without measurements of specimens. Measurements of specimens collected during this study are provided in table 3.

Specimens examined: 2 ♀♀ in total, both measured. Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 2 ♀♀ in the plot H (Herbicide), 4/4/2017 (see Material and methods).

Remarks: measurements of characters of La Réunion Island female specimens largely overlap with those of female specimens from Australia (Table 3). Measurements of La Réunion specimens are in general just a few percent's shorter, except for some setae or character dimensions which are quite shorter in La Réunion specimens, for example macrosetae of leg IV and size of ventral shields.

Table 2 Character measurements of adult females and males of *Neoseiulus barkeri* collected in this study with those in previous studies (localities followed by the number of specimens measured).

	♀								♂					
Characters	**La Réunion**	**Africa 1**	**Africa 2**	**Madagascar**	**Senegal**	**South Africa**	**Thailand**	**Various origins**	**La Réunion**	**Japan**	**Madagascar**	**South Africa**	**Thailand**	**Various origins**
	15, this study	5	8	1?	**1**	3	3	53	2, this study	?	10	2?	2	17
Dsl	**353** (333 – 373)	332 (318 – 348)	340 (328 – 360)	355	355	330 – 340	358 (336 – 377)	350 – 398	**260 – 268**	270	280	246 – 271	258 – 260	282 – 301
Dsw	**198** (180 – 223)	188 (180 – 204)	185 (173 – 203)	210	195	184 – 196	195 (185 – 210)	182 – 220	**160 – 163**	180	195	154 – 183	165 – 173	176 – 192
j1	**14** (13 – 15)	16 (14 – 17)	16 (14 – 17)	16 – 18	15	17 – 20	18 (17 – 19)	18 – 23	**13 – 15**	14	12	13 – 16	11 – 15	-
j3	**17** (13 – 20)	20 (18 – 23)	19 (18 – 21)	16 – 18	18	23 – 26	23 (23 – 24)	22 – 30	**13 – 15**	19	15	15 – 19	18	-
j4	**13** (5 – 20)	16 (14 – 17)	15 (13 – 16)	16 – 18	15	17 – 20	17 (16 – 18)	17 – 23	**13**	15	12	12 – 13	13	-
j5	**13** (10 – 15)	16 (14 – 17)	15 (13 – 16)	16 – 18	15	17 – 20	17	17 – 23	**13**	13	12	12 – 13	15	-
j6	**14** (8 – 18)	18 (16 – 19)	16 (13 – 18)	16 – 18	18	17 – 20	20	18 – 25	**13**	15	15	13 – 16	13 – 16	-
J2	**16** (10 – 20)	19 (19 – 20)	19 (16 – 22)	20	19	20 – 24	19 (17 – 21)	21 – 31	**13**	17	15	13 – 16	12 – 15	-
J5	**10** (8 – 13)	11 (10 – 11)	10 (10 – 11)	-	10	13 – 13	12 (11 – 12)	12 – 15	**8**	7	10	9	8	-
r3	**16** (10 – 18)	18 (17 – 20)	18 (16 – 19)	18	15	19 – 23	20	19 – 28	**13**	17	15	15 – 19	15 – 16	-
R1	**16** (13 – 18)	16 (14 – 17)	16 (14 – 16)	18	13	19 – 23	20 (19 – 20)	19 – 28	**13**	15	15	13 – 16	15	-
s4	**18** (8 – 23)	21 (19 – 24)	20 (18 – 22)	20	23	23 – 26	26 (25 – 26)	26 – 34	**15**	21	18	15 – 19	20 – 21	-
S2	**21** (18 – 25)	23 (22 – 24)	20 (19 – 24)	22	23	20 – 24	24	25 – 37	**20**	18	18	15 – 19	18	-
S4	**19** (15 – 23)	19 (17 – 22)	20 (18 – 22)	22	20	20 – 24	23 (22 – 23)	24 – 36	**15**	17	18	13 – 16	18 – 19	-
S5	**18** (18 – 23)	18 (17 – 19)	17 (16 – 19)	22	18	17 – 20	21 (20 – 22)	20 – 34	**15**	15	15	13 – 16	15 – 17	-
z2	**16** (10 – 18)	18 (17 – 19)	18 (18 – 21)	16	19	20 – 24	21 (20 – 21)	20 – 26	**13**	17	15	13 – 16	15 – 19	-
z4	**16** (10 – 20)	18 (17 – 19)	17 (16 – 19)	20	20	20 – 24	21	20 – 28	**15**	18	15	13 – 16	16 – 17	-
z5	**13** (10 – 15)	17 (16 – 19)	16 (13 – 18)	16	16	20 – 24	18	18 – 23	**15**	16	12	14	15 – 16	-
Z1	**17** (15 – 20)	20 (19 – 22)	19 (18 – 21)	22	21	20 – 24	23 (22 – 23)	22 – 32	**10**	17	15	15 – 19	16 – 17	-
Z4	**33** (30 – 38)	33 (31 – 34)	33 (29 – 38)	40	33	33 – 36	33 (32 – 33)	35 – 45	**25**	25	30	28 – 30	22 – 23	29 – 32
Z5	**50** (45 – 53)	49 (46 – 54)	51 (46 – 56)	55	45	52 – 55	53 (52 – 55)	48 – 66	**30**	29	35	31 – 38	27 – 29	35 – 39
st1-st1	**52** (48 – 55)	-	-	-	-	-	-	-	**45**	-	-	-	-	-
st2-st2	**65** (63 – 68)	62 (60 – 67)	63 (61 – 67)	-	65	68 – 72	68 (65 – 70)	67 – 76	**55**	-	-	-	-	-
st3-st3	**73** (70 – 75)	-	-	-	-	-	-	-	**58**	-	-	-	-	86 – 93
st1-st3 ♀ / st1-st5 ♂	**67** (63 – 70)	61 (58 – 62)	63 (61 – 65)	70	63	78 – 84	69 (67 – 72)	-	**108 – 113**	-	-	125	-	120 – 129
st4-st4	**73** (65 – 80)	-	-	-	-	-	-	-	**45 – 48**	-	-	-	-	-
st5-st5	**64** (60 – 68)	61 (60 – 62)	60 (56 – 63)	-	55	70 – 78	61 (60 – 64)	-	**35 – 38**	-	-	-	-	-
Lisl	**26** (25 – 30)	-	-	-	-	-	-	24 – 32						
Lisw	**4** (3 – 5)	-	-	-	-	-	-	-				Not applicable		
Sisl	**14** (10 – 18)	-	-	-	-	-	-	-						
Vsl	**120** (113 – 128)	117 (115 – 120)	114 (109 – 120)	125	113	112 – 117	131 (122 – 139)	116 – 145	**105 – 110**	-	120	106 – 111	110	-
Vsw *ZV2*	**96** (90 – 100)	105 (101 – 108)	102 (96 – 107)	110	90	98 – 104	106 (105 – 108)	99 – 120	**130 – 133**	-	145	85 – 91	133	133 – 146
Vsw *anus*	**29** (28 – 33)	81 (72 – 86)	-	-	-		-	-	**63 – 68**	-	-	-	-	-
JV5	**40** (33 – 43)	-	-	-	-	43 – 46	-	44 – 60	**30**	22	-	25 – 32	-	24 – 37
StIV	**57** (48 – 68)	62 (60 – 67)	63 (58 – 69)	62	55	66	66 (62 – 70)	58 – 74	**42 – 50**	42	60	55 – 60	43 – 46	48 – 52
Scls	**40** (20 – 50)	19 (17 – 22)	-	-	25	22	19 (18 – 20)	17 – 25				Not applicable		
Scw	**22** (18 – 25)	-	-	-	-	-	-	5 – 11						
Fdl	**33** (30 – 38)	-	30 (29 – 31)	29	-	30	28 (25 – 30)	30 – 34	**20**	-	24	-	22	20 – 23
No teeth Fd	**5**	-	5	-	-	3	-	4 – 6	**4**	-	-	-	-	3 – 5
Mdl	**31** (28 – 33)	-	33 (32 – 33)	33	-	34	38 (36 – 40)	33 – 37	**20**	-	24	-	23 – 26	21 – 23
No teeth Md	**1**	-	1	-	-	1	-	1	**1**	-	-	-	-	1
Shaft				Not applicable					**15**	-	15	-	13 – 21	15 – 17

Sources of measurements – For ♀♀: Africa 1 (Ghana + Nigeria): Moraes *et al.* (1989b); Africa 2 (Benin: 2♀; Burundi: 1♀; Ghana: 1♀; Kenya: 2♀♀; Nigeria: 1♀; Mozambique: 1♀): Zannou *et al.* (2006); Madagascar: Blommers & Chazeau (1974); Senegal: Kade *et al.* (2011); South Africa (identified as *Amblyseius usitatus*, synonymized Ueckermann & Loots 1988): van der Merwe (1965); Thailand: Oliveira *et al.* (2012); Various origins (Canada: 7♀♀; Finland: 20♀♀; South Korea: 9♀♀; Spanish Morocco: 1♀; UK: 2♀♀; USA: 14♀♀): Beaulieu & Beard (2018). For ♂♂: Japan: Ehara (1972); Madagascar (identified as *Amblyseius masiaka*, synonymized by Ueckermann & Loots 1988): Blommers & Chazeau (1974); South Africa: Ueckermann & Loots (1988); Thailand: Oliveira *et al.* (2012); Various origins (Finland: 13♂♂; South Korea: 1♂; UK: 1♂; USA: 2♂♂): Beaulieu & Beard (2018). - : not provided.

Neoseiulus californicus (McGregor)

Typhlodromus californicus McGregor 1954: 89.
Amblyseius californicus, Schuster & Pritchard 1963: 271.
Cydnodromus californicus, Athias-Henriot 1977: 62.
Amblyseius (*Amblyseius*) *californicus*, Ueckermann & Loots 1988: 150; Ehara *et al.* 1994: 126.
Amblyseius (*Neoseiulus*) *californicus*, Ehara & Amano 1998: 33.
Neoseiulus californicus, Moraes *et al.* 1986: 73; Chant & McMurtry 2003a: 21; Moraes *et al.* 2004a: 109; Chant & McMurtry 2007: 25; Guanilo *et al.* 2008a: 27, 2008b: 19.
Neoseiulus chilenensis Dosse 1958: 55 (synonymy according to McMurtry & Badii 1989).
Neoseiulus mungeri McGregor 1954: 92 (synonymy according to Schuster & Pritchard 1963).
Neoseiulus wearnei Schicha 1987: 103 (Synonymy according to Tixier *et al.* 2014).

Like the previous species, *N. californicus* belongs also to the *cucumeris* species group of *Neoseiulus* (Chant and McMurtry 2003a).

This widespread species (Moraes *et al.* 2004; Demite *et al.* 2019) is considered by McMurtry and Croft (1997) to be a specialized predator, Type 2. Nevertheless, it has characteristics of both specialist and generalist predatory mites (Castagnoli and Simoni 2003). It prefers to feed on spider mites (Gomez *et al.* 2009), but can also consume other mite species like tarsonemid mites [*Phytonemus pallidus* (Banks)] (Easterbrook *et al.* 2001), small insects such as thrips (Rodriguez-Reina *et al.* 1992) and even pollen when the primary prey is unavailable (Rhodes and Liburd 2006). It can migrate from grasses to fruit trees or grapevines and vice versa (Auger *et al.* 1999). It is a specialist predator of *T. urticae* on annual plants and woody species, and of *Panonychus ulmi* (Koch) and various *Tetranychus* spp. (and perhaps eriophyid mites) on trees and less frequently on grapevines (Auger *et al.* 1999). *N. californicus* is well-known as a BCA sold in many countries around the world for the management of spider mites in greenhouses but also in outdoor crops such as fruit crops in Europe. This is the first mention of that species for La Réunion Island.

Table 3 Character measurements of adult females of *Neoseiulus bayviewensis* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	La Réunion 2, this study	Australia 7	Characters	La Réunion 2, this study	Australia 7	Characters	La Réunion 2, this study	Australia 7
Dsl	**293 – 350**	349 – 357	*z2*	**30 – 33**	35 – 38	Vsl	**90 – 125**	111 – 117
Dsw	**143 – 150**	163 – 174	*z4*	**30 – 35**	38 – 43	Vsw *ZV2*	**78 – 95**	75 – 85
j1	**23**	21 – 25	*z5*	**18 – 20**	19 – 20	Vsw *anus*	**58 – 65**	-
j3	**33 – 38**	42 – 44	*Z1*	**26 – 28**	32 – 38	*JV5*	**38 – 40**	-
j4	**18 – 20**	23 – 25	*Z4*	**45 – 48**	47 – 50	*SgeIV*	**20 – 23**	28 – 31
j5	**16 – 20**	21 – 23	*Z5*	**46 – 53**	57 – 61	*StiIV*	**18**	21 – 28
j6	**20**	21 – 24	*st1-st1*	**50**	-	*StIV*	**48**	61 – 65
J2	**18 – 25**	28 – 33	*st2-st2*	**59 – 61**	-	*Scls*	**13**	14 – 16
J5	**8**	11 – 12	*st3-st3*	**70 – 75**	96 – 101	*Scw*	**10**	-
r3	**28 – 30**	28 – 31	*st1-st3*	**50 – 55**	68 – 71	Fdl	**23**	33 – 34
R1	**25 – 28**	28 – 31	*st4-st4*	**83 – 85**	-	No teeth Fd	**3?**	4
s4	**43 – 48**	47 – 51	*st5-st5*	**56 – 60**	73 – 78	Mdl	**25**	33 – 34
S2	**43 – 45**	43 – 49	Lisl	**20**	-	No teeth Md	**1?**	2
S4	**40**	36 – 39	Lisw	**4**	-			
S5	**23 – 24**	26 – 29	Sisl	**6**	-			

Sources of measurements – Australia: Schicha (1977); -: not provided.

Specimens examined: 18 ♀♀ + 2 ♂♂ in total, 14 ♀♀ + 2 ♂♂ measured. Ravine des Cabris – Ligne des Bambous, Lassay (aasl 221 m, Long 55°29'38" E, Lat 21°17'17" S), 1 ♀ on *Amaranthus viridis* L., 5/12/2016; Le Tampon – Grand Tampon (aasl 1100 m, Long 55°34'12" E, Lat 21°16'48" S), 6 ♀♀ + 1 ♂ on *Cyperus rotundus* L., 1 ♀ + 1 ♂ on *Plantago lanceolata* L. and 1 ♀ on *Solanum mauritianum* Scop., 18/1/2017; Montvert-les-Hauts – EARL Le Mont Vert farm (aasl 582 m, Long 55°32'19" E, Lat 21°19'42" S), 1 ♀ on *Fragaria* sp., 4/8/2015, 1 ♀ on *C. annuum*, 23/8/2016; Le 19e – Plaine des Caffres, JL Robert farm (aasl 1000 m, Long 55°32'9" E, Lat 21°14'16" S), 1 ♀ on *Physalis peruviana* L., and 2 ♀♀ on *Emilia sonchifolia* (L.) DC., 15/12/2015; Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 4 ♀♀ in plots BM and CC, 4/4/2017.

Remarks: measurements of characters of the 14 female specimens (Table 4) fit well with those obtained for populations of other countries, such as those obtained from Tixier *et al.* (2008).

Values of measurements of La Réunion specimens are generally only slightly smaller (few percents variations). The same remark can be addressed for the adult male specimens (Table 4).

Comparisons with *N. californicus* measurements of a large number of female (Table 4) specimens of various origins in Beaulieu and Beard (2018) shows shorter dimensions of all characters of La Réunion specimens (all ranges of La Réunion specimens are in the lower parts of the ranges mentioned by these authors).

This is interesting to notice that it is not the case for males (Table 4), measurements of male specimens from La Réunion covering ranges or being in the middle of ranges mentioned by Beaulieu and Beard (2018) in their redescription.

Neoseiulus houstoni Schicha

Neoseiulus houstoni, Schicha 1987: 111; Chant & McMurtry 2003a: 23; Moraes *et al.* 2004a: 123.
Neoseiulus recifensis Gondim Jr. & Moraes 2001: 77; Chant & McMurtry 2003a: 23; Moraes *et al.* 2004a: 140, **new synonymy**.
Neoseiulus barreti Kreiter, in Furtado *et al*. 2005: 135, **new synonymy**.

These three species belong also to *the cucumeris* species group of *Neoseiulus* like previous species. However, whereas Chant and McMurtry (2003a) classified *N. recifensis* in the *cucumeris* species subgroup, *N. houstoni* was placed in the *paraki* species subgroup (also in the *cucumeris* species group), despite the two species having identical spermathecae (Chant and McMurtry 2003a). *Neoseiulus barreti* was described later than 2003, is not mentioned in Chant and McMurtry (2007) but the spermatheca is also identical to that of the two former species.

Neoseiulus houstoni was the first species collected and described in 1987 on *Vigna unguiculata* (L.) Walp. in Queensland, Australia (Schicha 1987).

Neoseiulus recifensis was discovered for the first time in Brazil in 2001 (Gondim Jr. and Moraes 2001), collected on *Cocos nucifera* L. in Recife and Itamaraca, Pernambuco, Brazil. It was collected then in 2007 and 2008 in Brazil in the states of Alagoas, Bahia, Cera, Paraiba and Rio Grande do Norte (Fiaboe *et al.* 2007; Lawson-Balagbo *et al.* 2008). Finally, it was collected in La Réunion Island in 2011 within a survey investigating potential predators of *R. indica* on coconut (Moares *et al.* 2012).

Two females of *N. barreti* were collected, only one time, in Brazil in 2004 on *Solanum paniculatum* L. in Itapaje, Ceara, Brazil and described later (Furtado *et al.* 2005).

Biology of the three species remain unknown. Males of the three species are unknown.

Specimens examined: 37 ♀♀ + 8 ♂♂ + 4 im. in total, 24 ♀♀ + 8 ♂♂ measured. Langevin – Jacqueline Waterfall (aasl 5 m, Long 55°64'40" E, Lat 21°38'69" S), 4 ♀♀ + 2 ♂♂ on *Casuarina equisetifolia* L., and 3 ♀♀ + 1 im. on *Scaevola taccada* Vahl, 19/7/2017; Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 1 ♀ in plot H, 12/4/2016; 1 ♀ on *B. pilosa*, 1 ♀ on *Euphorbia hypericifolia* Lam., and 1 ♀

on *P. maximum*, 20/2/2017; 1 ♀ on *Artocarpus heterophyllus* Lam., 5 ♀♀ on *C. equisetifolia*, 1 ♀ on *Acacia mearnsii* De Wild., and 2 ♂ on *Crotalaria retusa* L., 27/2/2017; 4 ♀♀ + 2 im. on *B. pilosa*, 2 ♀♀ on *L. leucocephala*, 1 ♀ on *Malvastrum coromandelianum* (L.), and 8 ♀♀ + 4 ♂♂ + 1 im. on *Parthenium hysterophorus* L., 30/3/2017; 1 ♀ in plot CC, 3/04/2017 and 1 ♀ in plot CC, 6/04/2017; 1 ♀ on *B. pilosa*, 19/6/2017; 1 ♀ on *A. viridis,* 20/6/2017.

We have also examined the following type or additional material:

- The holotype of *N. houstoni*;
- The holotype, paratypes female and additional female material of *N. recifensis*;
- One paratype female of *N. barreti*.

Table 4 Character measurements of adult females and males of *Neoseiulus californicus* collected in this study with those in previous studies (localities followed by the number of specimens measured).

	♀							♂				
Characters	**La Réunion**	**Argentina**	**Australia**	**Peru**	**Senegal**	**VCW 1**	**VCW 2**	**La Réunion**	**Argentina**	**Japan**	**Peru**	**VCW**
	14, this study	3	1	4	5	300	99	2, this study	1	1	1	34
Dsl	**374** (353 – 403)	345 (325 – 360)	370	378 (360 – 398)	350 (340 – 375	367 (330 – 406)	340 – 406	**288 – 293**	280	280	288	265 – 316
Dsw	**188** (168 – 205)	167 (150 – 175)	150	176 (160 – 185)	174 (168 – 187)	146 (130 – 189)	168 – 216	**163 – 165**	160	170	160	111 – 131
j1	**21** (18 – 23)	21 (20 – 22)	21	23 (21 – 25)	22 (20 – 23)	22 (17 – 26)	20 – 26	**15 – 18**	16	17	18	-
j3	**27** (20 – 30)	28 (25 – 30)	29	34 (31 – 38)	30 (25 – 33)	31 (22 – 39)	26 – 38	**20 – 25**	27	18	25	-
j4	**21** (18 – 25)	21 (20 – 22)	19	24 (22 – 26)	25 (23 – 28)	22 (16 – 27)	18 – 30	**15 – 18**	20	14	18	-
j5	**20** (15 – 23)	21 (20 – 24)	19	25 (22 – 26)	24 (20 – 27)	22 (16 – 28)	18 – 30	**13 – 15**	19	14	18	-
j6	**26** (23 – 30)	25 (22 – 28)	25	30 (25 – 36)	28 (25 – 33)	27 (19 – 32)	24 – 36	**18 – 20**	23	17	25	-
J2	**29** (28 – 30)	32 (30 – 35)	25	36 (31 – 40)	31 (28 – 33)	32 (25 – 40)	28 – 41	**20 – 25**	28	22	28	-
J5	**12** (10 – 13)	11 (10 – 13)	10	13 (10 – 15)	13 (13 – 15)	13 (9 – 16)	11 – 16	**8 – 10**	10	9	10	-
r3	**24** (20 – 28)	23 (20 – 25)	23	28 (25 – 30)	25 (24 – 25)	25 (18 – 32)	23 – 30	**20 – 23**	20	17	23	-
R1	**23** (20 – 25)	21 (18 – 22)	19	26 (23 – 27)	23 (22 – 23)	23 (17 – 29)	20 – 28	**20 – 23**	19	17	23	-
s4	**32** (28 – 38)	35 (30 – 39)	34	41 (36 – 45)	32 (30 –38)	35 (27 – 44)	29 – 44	**23 – 28**	29	23	35	-
S2	**38** (30 – 50)	36 (32 – 38)	38	46 (45 – 47)	40 (38 – 45)	40 (30 – 48)	33 – 47	**33 – 35**	34	27	35	-
S4	**38** (33 – 43)	34 (31 – 37)	33	39 (36 – 42)	37 (35 – 38)	37 (27 – 49)	30 – 45	**33 – 38**	32	29	33	-
S5	**27** (23 – 33)	28 (25 – 30)	25	32 (29 – 35)	31 (30 – 33)	32 (22 – 42)	26 – 39	**25**	22	26	28	-
z2	**26** (20 – 33)	25 (20 – 30)	24	34 (32 – 35)	25 (23 – 28)	29 (20 – 29)	24 – 37	**18 – 25**	26	17	20	-
z4	**25** (20 – 33)	28 (25 – 30)	25	34 (32 – 37)	28 (25 – 33)	29 (20 – 37)	24 – 37	**18 – 23**	23	17	25	-
z5	**20** (15 – 23)	21 (19 – 23)	20	26 (23 – 27)	24 (23 – 28)	22 (17 – 27)	21 – 29	**15**	19	15	20	-
Z1	**30** (23 – 35)	30 (28 – 32)	29	37 (34 – 40)	36 (33 – 40)	32 (20 – 41)	24 – 42	**23 – 25**	28	22	28	-
Z4	**51** (48 – 55)	45 (40 – 48)	48	53 (51 – 55)	50 (48 – 53)	51 (42 – 59)	45 – 61	**45 – 50**	43	43	50	38 – 51
Z5	**71** (65 – 75)	65 (62 – 67)	67	70 (65 – 75)	65 (55 – 73)	70 (59 – 97)	62 – 83	**53 – 58**	45	49	53	48 – 61
st1-st1	**53** (50 – 58)	-	-	-	-	50 (45 – 58)	-	**48**	-	-	-	-
st2-st2	**63** (60 – 68)	57 (53 – 60)	-	63 (59 – 65)	62 (53 – 68)	60 (55 – 69)	-	**53 – 55**	-	-	-	-
st3-st3	**73** (68 – 80)	-	70	-	-	71 (63 – 82)	-	**55 – 58**	-	-	-	-
st1-st3 ♀ / st1-st5 ♂	**67** (63 – 70)	60 (58 – 62)	65	62 (59 – 65)	63 (53 – 68)	66 (60 – 75)	-	**113 – 115**	-	-	-	111 – 131
st4-st4	**76** (65 – 88)	-	-	-	-	86 (58 – 143)	-	**48**	-	-	-	-
st5-st5	**67** (65 – 70)	62 (58 - 65)	72	60 (58 – 62)	67 (63 – 73)	69 (41 – 79)	-	**40 – 43**	-	-	-	-
Lisl	**28** (23 – 30)	-	30	-	-	30 (20 – 36)	-					
Lisw	**5** (3 – 5)	-	-	-	-	5 (4 – 8)	-			Not applicable		
Sisl	**12** (10 – 15)	-	13	-	-	-	-					
Vsl	**123** (110 – 135)	118 (105 - 125)	119	130 (117 – 135)	119 (113 - 127)	117(99 – 134)	110 – 137	**113**	155	-	113	105 – 122
Vsw *ZV2*	**101** (95 – 108)	98 (88 - 105)	107	102 (95 – 105)	96 (95 - 105)	104(88 – 102)	94 – 119	**80 – 85**	150	-	163	138 – 170
Vsw *anus*	**84** (73 – 93)	68 (63 – 75)	-	66 (65 – 67)	-	73 (60 – 87)	-	**23 – 25**	-	-	-	-
JV5	**48** (43 – 53)	47 (45 – 50)	49	49 (48 – 50)	-	53(40 - 70)	44 – 64	**33 – 40**	-	31	-	30 – 44
StIV	**53** (45 – 58)	50 (45 – 54)	53	54 (51 – 60)	52 (48 – 60)	49(30 - 62)	47 – 58	**43**	37	38	43	39 – 46
Scl	**11** (8 – 15)	12	12	11 (10 – 13)	10 (9 – 10)	5 – 10	7 – 15					
Scw	**11** (10 – 15)	-	14	-	-	-	8 – 18			Not applicable		
Fdl	**29** (25 – 33)	26	27	30 (29 – 31)	-	28 – 35	23 – 26	**20**	-	-	-	19 – 21
No teeth Fd	**3**	3	5	2	3	-	4 – 5	-	-	-	-	3
Mdl	**27** (25 – 30)	25	29	25 (24 – 26)	-	23 – 30	26 – 31	**20**	-	-	-	20 – 23
No teeth Md	**2**	1	2	2	2	-	3	-	-	-	-	1
Shaft				Not applicable				**18**	-	-	-	15 – 17

Sources of measurements – For ♀♀: Argentina: Guanilo *et al.* (2008b); Australia: Schicha (1987) (identified as *N. wearnei* , synonymized by Tixier *et al.* 2014); Peru: Guanilo *et al.* (2008a); Senegal: Kade *et al.* (2011); VCW 1 (Various countries of the world: Brasil, Chile, France, Greece, Italia, Japan, Spain, Tunisia, California): Tixier *et al.* (2008); VCW2 (Australia: 28♀; Canada: 10♀; Chile: 7♀; Guatemala: 1♀; Kenya: 8♀♀; South Korea: 5♀♀; USA: 40♀♀): Beaulieu & Beard (2018). For ♂♂: Argentina: Guanilo *et al.* (2008b); Japan (identified as *N. chilenensis* , synonymized by McMurtry & Badii 1989): Ehara (1964); Peru: Guanilo *et al.* (2008a); VCW (Australia: 5♂♂; Canada: 6♂♂; Chile: 1♂; Kenya: 3♂♂; South Korea: 4♂♂; USA: 15♂♂): Beaulieu & Beard (2018); -: not provided.

Remarks: character measurements of the 24 females collected in La Réunion (Table 5) agree very well with those obtained from females of *N. barreti* or *N. recifensis* from Brazil and females of *N. houstoni* from Australia described previously (Gondim Jr. and Moraes 2001, Schicha 1987, Furtado *et al.* 2005). We consider so far that our specimens can be anyone of the three species and that examination of the specimens collected in this study can lead to anyone of the three species. Consequently, the morphometrics strongly suggest synonymy.

There are however some discrepancies between our measurements and observations and previous descriptions of the three species. In the three descriptions:

- Dorsal shield is reticulated in the description of *N. barreti* in the anterior lateral margins and starting to the back of *s4* and on all the posterior part of the dorsal shield except the center;
- VA shield has straight slightly convex margins in Schicha 1987 and not in the two other species as a concave part exists in this margin just after *ZV2* position;
- *Z4* and *Z5* are progressively tapered in drawings of *N. barreti* and *Z5* seems longer (Furtado *et al.* 2005) *vs* for other species they are blunt/rounded apically (or more regularly parallel-sided);
- Macrosetae *SgeIV*, *StiIV* and *StIV* are mentioned as setaceous for *N. recifensis* (Moraes and Gondim Jr 2001) but seem slightly knobbed on illustrations of the species. *SgeIV* and *StIV* are slightly knobbed for *N. barreti* and *N. houstoni* and *StiIV* is not mentioned for *N. houstoni*;
- two teeth on the fixed digit and no tooth on the movable digit are mentioned for *N. barreti* and *N. recifensis* but three teeth for fixed digit and one recurved tooth for the movable digit are mentioned for *N. houstoni*;
- Spermathecae of *N. barreti* and *N. recifensis* are mentioned as trumpet-shaped but as bell-shaped for *N. houstoni*;
- Setae *JV5* seem longer in *N. barreti* description and shorter in those of *N. houstoni* and *N. recifensis*;
- 6 poroids around genital/ventrianal shield are drawn for *N. recifensis* but only 4 for *N. barreti* and 0 for *N. houstoni*;
- Occurrence of *JV3* is mentioned in the text of description of *N. barreti* but not illustrated (Furtado *et al.* 2005). These setae are not indicated for description of *N. houstoni* and *N. recifensis*.
- Chaetotactic formulae are not precised in the description of *N. houstoni* but mentioned only for genu II for *N. barreti* and for genua II and III for *N. recifensis*.

Our examination of the type material for *N. barreti* (one paratype ♀), *N. houstoni* (the single specimen found, the ♀ holotype) and *N. recifensis* (the ♀ holotype, one ♀ paratype and seven additional ♀) shows:

- dorsal shields of the three species present exactly the same reticulation as drawn in Furtado *et al.* (2005) for the description of *N. barreti*;
- VA shield present only a slight concavity after *ZV2* position in *N. houstoni*;
- *Z4* and *Z5* are progressively tapered regularly parallel-sided in the three species and *Z5* is of the same length (see table 8);
- Macrosetae *SgeIV*, *StiIV* and *StIV* are: rounded apically for *SgeIV*, pointed apically for *StiIV* and slightly knobbed for *StIV* for the three species;

- Three teeth on fixed digit (two strong anterior and one small tooth posterior to pilus dentilis) and one small recurved tooth in the anterior part of the movable digit for the three species, just as drawn by Schicha (1987);
- Spermathecae of *N. barreti* and *N. recifensis* are drawn exactly in the same way in original descriptions (Schicha 1987; Moraes and Gondim Jr. 2001; Furtado *et al.* 2005) and are identical in the three species after our examination (and "bell-shaped" seems more appropriate for the shape description);
- Setae *JV5* are of similar length for the three species (see table 5);
- 6 poroids are present around genital/ventrianal shield for the three species;
- The mention of *JV3* was an error in the text of the description of *N. barreti*. This seta is not present in the venter of that species and also not present in the two others;
- Chaetotactic formulae are identical for the three species: Genu II: 2-2/0 - 2/0-1 (seven setae); Genu III: 1-2/1 - 2/0-1 (seven setae).

Considering all these information, we can conclude that the three species are synonyms. Consequently, our specimens are identified as the first species described among the three species, *N. houstoni*. The valid species name is thus *Neoseiulus houstoni* (Schicha). Previous specimens collected in La Réunion Island and identified as *N. recifensis* are renamed *N. houstoni*. Consequently, this is the first report of that species in La Réunion Island.

The male (for the three species) being unknown, it is herein described for the first time, based on La Réunion specimens.

Description of the adult male of *Neoseiulus houstoni* (Schicha)

n = 8 (Figs 1a-c)

Diagnosis — The following combination of characters indicated below in the description of the male of this species is quite similar to a lot of species of *Neoseiulus* belonging to the *cucumeris* and *paraki* species subgroups of the *cucumeris* species group. Not many characters allow to distinguish it from all males of other species if no females are collected in the same time: the peritreme reaching the level between *j1* and *j3*, a limited reticulation compared to several species of these two subgroups, some dorsal setae length, especially *s4*, *S2*, *Z4* and *JV5* approximately of the same length (30 – 35) and longest setae after *Z5*, a spermatodactyl with a terminal part recurved as an open U (hook-like), no additional macrosetae on other legs than leg IV compared to several species of these two subgroups that have macrosetae on leg III, sometimes II, only three pairs of preanal setae instead of 4 pairs in males of several species of these subgroups, one pair of crateriform *gv3* very close to setae *JV2*.

Dorsum — (Fig. 1a). Dorsal shield fused with the peritremal shield at the level of j1 position, with slight reticulations all around the edge and in the posterior part of the dorsal shield, 200 (183 – 213) long and 129 (115 – 140) wide, with six pairs of solenostomes (*gd 1, 2, 5, 6, 8, 9*). The dorsal shield bears 17 pairs of dorsal setae and 2 pairs of sub-lateral setae on the dorsal shield: *j1* not visible, *j3* 28, *j4* 13, *j5* 15, *j6* 18, *J2* 15, *J5* 5, *z2* 25, *z4* 28, *z5* 18, *Z1* 15, *Z4* 35, *Z5* 40, *s4* 38, *S2* 33, *S4* 18, *S5* 15, *r3* 20, *R1* 20. All setae smooth except *Z4* and *Z5* serrated.

Peritreme — (Fig. 1a). Extending between *j1* and *j3*. Peritremal shield fused with dorsal shield.

Venter — (Fig. 1b). Sternal shield smooth. Distances between *st1 – st1* 43, *st2 – st2* 50, *st3 – st3* 53, *st1 – st5* 98, *st4 – st4* 43, *st5 – st5* 33. Ventrianal shield with three pairs of pre-anal setae, *JV1*, *JV2*, and *ZV2*, and one pair crateriform *gv3*, mesad of the VAS, just a bit after the insertion line of setae JV2 but very close from these setae. Three pairs of poroids discernible on specimen ventrianal shields examined. Soft cuticle surrounding ventrianal shield with one

Table 5 Character measurements of adult females of *Neoseiulus* sp. collected in this study with those of *N. barreti, N. houstoni* and *N. recifensis* (species/localities followed by the number of specimens measured).

Characters	La Réunion	*Neoseiulus barreti 2* Brazil	*N. houstoni* 1 Australia	*N. houstoni 2* Australia	*N. recifensis 1* Brazil	*N. recifensis 2* Brazil
	24, this study	2, remeasured here*	1	1, remeasured here*	8	9*
Dsl	**291** (264 – 313)	295 – 298	285	288	279 (268 – 291)	290 (268 – 305)
Dsw	**150** (138 – 165)	148 – 160	124	140	143 (142 – 145)	141 (113 – 150)
Peritreme reaching	***j1***	*j1*	*j1*	*j1*	*j1*	*j1*
Solenostomes	***gd 1, 2, 5, 6, 8, 9***	*gd 1, 2, 5, 6, 8, 9*	*gd 1, 2, 5, 6, 8, 9*	*gd1, 2, 5, 6, 8, 9*	*gd 1, 2, 5, 6, 8, 9*	*gd 1, 2, 5, 6, 8, 9*
j1	**22** (20 – 25)	23 – 25	19	18	21 (19 – 22)	21 (20 – 23)
j3	**34** (28 – 38)	35 – 38	31	30	33 (32 – 35)	34 (28 – 38)
j4	**17** (15 – 20)	15 – 18	13	15	16 (15 – 18)	17 (15 – 18)
j5	**17** (15 – 20)	17	15	15	16 (15 – 18)	18 (15 – 20)
j6	**21** (18 – 23)	20 – 23	17	18	20 (19 – 23)	21 (18 – 25)
J2	**24** (20 – 28)	25	19	20	22 (21 – 24)	24 (20 – 28)
J5	**7** (5 – 9)	7	8	7	7 (6 – 7)	8
r3	**29** (25 – 33)	30	24	28	31 (30 – 34)	33 (28 – 35)
R1	**28** (25 – 32)	30 – 33	29	30	28 (26 – 30)	31 (30 – 35)
s4	**43** (40 – 48)	45 – 48	40	43	45 (43 – 47)	46 (43 – 48)
S2	**43** (40 – 45)	43 – 48	40	43	42 (41 – 44)	43 (40 – 45)
S4	**23** (20 – 25)	23 – 25	24	25	21 (21 – 24)	24 (23 – 25)
S5	**22** (20 – 25)	23	22	20	21 (19 – 23)	22 (20 – 25)
z2	**33** (30 – 38)	33	29	28	33 (30 – 35)	34 (28 – 38)
z4	**32** (25 – 36)	33 – 38	31	30	34 (32 – 36)	34 (30 – 38)
z5	**18** (18 – 20)	18	14	15	17 (16 – 19)	18 15 – 20)
Z1	**26** (23 – 30)	25 – 30	23	23	24 (22 – 26)	25 (20 – 28)
Z4 serrated	**46** (43 – 53) ser.	45 – 50 ser.	41 ser.	45 ser.	47 (44 – 49) ser.	48 (45 – 50) ser.
Z5 serrated	**49** (45 – 53) ser.	50 – 55 ser.	47 ser.	48 ser.	50 (47 – 53) ser.	52 (43 – 55) ser.
st1-st1	**50** (48 – 53)	**54***	-	48	-	50 (43 – 53)
st2-st2	**60** (55 – 73)	63	-	58	57 (54 – 60)	58 (55 – 63)
st3-st3	**71** (65 – 75)	**75***	69	68	-	67 (58 – 73)
st1-st3	**52** (48 – 55)	53 – 55	57	54	53 (49 – 53)	56 (50 – 60)
st4-st4	**79** (68 – 93)	**88***	-	60	-	78 (48 – 93)
Gensl	**99** (93 – 110)	100	-	100	-	97 (93 – 100)
Gensw *st5*	**61** (55 – 65)	63	-	60	-	62 (60 – 63)
Gensw post. corn.	**69** (65 – 75)	68	-	68	-	67 (63 – 70)
st5-st5	**57** (53 – 60)	60	-	58	58 (57 – 60)	60 (58 – 60)
Lisl	**18** (15 – 28)	17 – 22	19	20	-	20 (20 – 23)
Lisw	**4** (3 – 5)	5	-	4	-	5 (4 – 5)
Sisl	**7** (5 – 13)	**9***	8	8	-	9 (8 – 10)
Vsl	**92** (85 – 98)	95 – 103	57	95	92 (89 – 95)	97 (88 – 100)
Vsw *ZV2*	**68** (60 – 75)	73	69	73	69 (68 – 72)	76 (70 – 83)
Vsw *anus*	**61** (58 – 65)	63 – 68	-	58	62 (59- 64)	66 (62 – 68)
gv3 distance	**18** (15 – 23)	18	-	18	-	18 (15 – 20)
JV5 ser. or not	**41** (38 – 50) *not*	35 – 42 *not*	36 *not*	38 *not*	-	42 (30 – 48) *not*
SgeIV	**21** (18 – 23) **knob.**	15 – 20 knob.	20 knob.	23 knob.	21 (19 – 21)	21 (20 – 23) knob.
StiIV	**15** (13 – 18)	15 – 17	-	15	17 (16 – 19)	19 (18 – 20)
StIV	**29** (25 – 33)	27 – 32	25 bl.	25 bl.	30 (27 – 32)	30 (28 – 33)
Scl	**22** (13 – 40)	**13***	11	15	13 (12 – 14)	16 (13 – 18)
Calyx l.	**12** (10 – 13)	**10***	-	10	-	12 (10 – 13)
Scw	**13** (5 – 25)	12	8	10	-	10
Fdl, No teeth	**25** (25 – 30)**, 2+1**	**30, 2+1***	29 – 31, 2 + 1	30, 2 + 1	27 (26 – 27), 2	26 (20 – 28), 2 + 1
Mdl, No teeth	**24** (23 – 28), **1**	**30, 1***	29 – 31, 1	28, 1	28 (26 – 29), 0	25 (21 – 28), 1

Sources of measurements – *Neoseiulus barreti* Brazil: Furtado *et al.* (2005) (measured again by the senior author with * complementary measurements); *N. houstoni* Australia 1 (holotype): Schicha (1987); *N. houstoni* Australia 2: *measurements by the senior author; *N. recifensis Brazil 1* (holo- and paratypes): Gondim Jr & Moraes (2001); *N. recifensis* Brazil 2 (holotype and additional material): *measurements by the senior author; -: not provided.

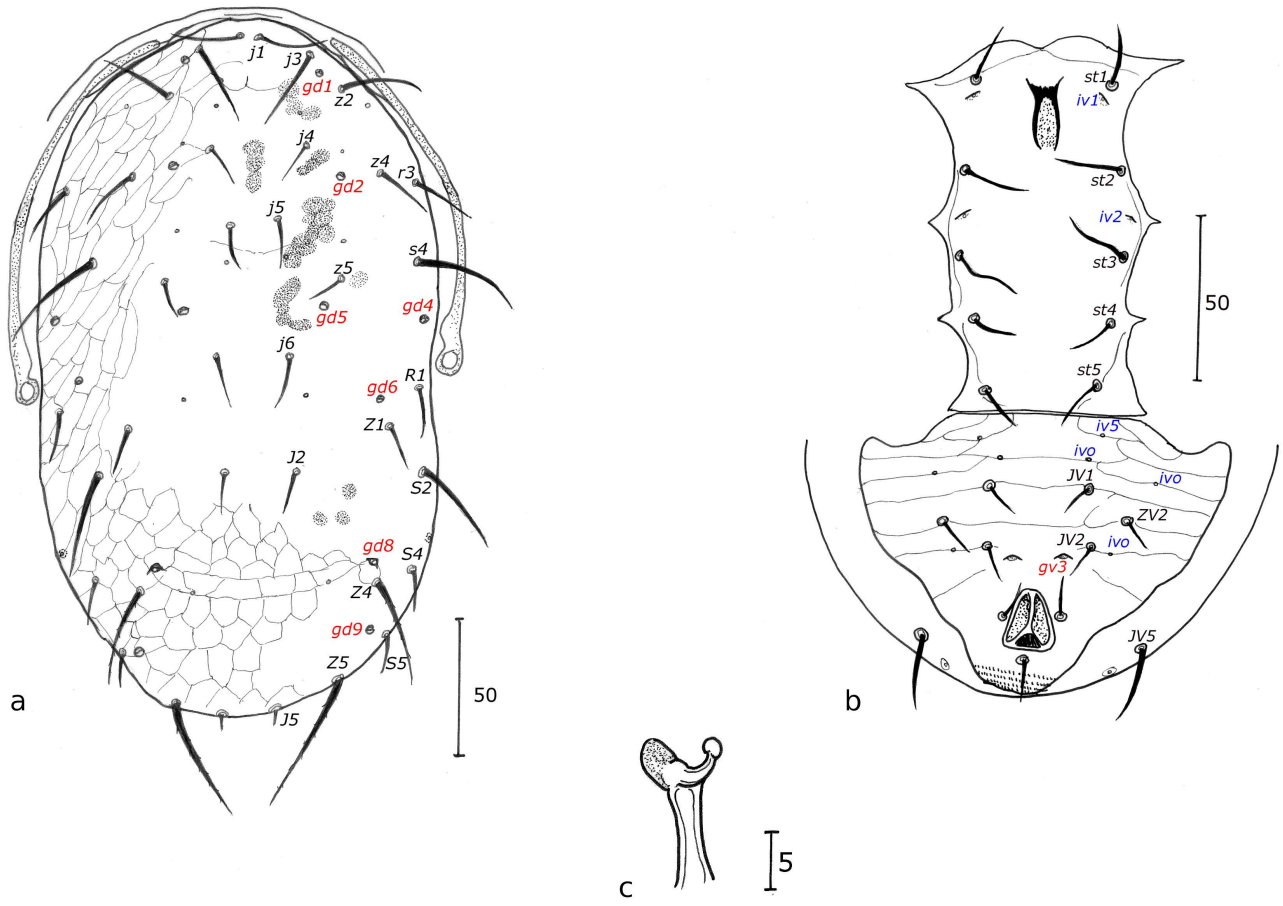

Figure 1 Male of *Neoseiulus houstoni* Schicha: a – Dorsal shield and peritreme; b – Ventral shields; c – Spermatodactyl.

pair of setae (*JV5*); ventrianal shield 83 long, 120 wide at anterior corners and 60 wide at level of paranal setae. *JV5* smooth, 35 long. A pair of lyrifissures near *JV5*.

Chelicera — Fixed digit 20 long, no tooth discerned and movable digit 18 long with no tooth discerned because chelicerae are dorsoventrally oriented. Spermatodactyl with an open U-shaped foot, shaft (Fig. 1c) 13 long.

Legs — Legs IV with three macrosetae like in the female: *SgeIV* slightly knobbed 18, *StiIV* pointed 15, *StIV* very slightly knobbed 23. Chaetotactic formula of genu II and III similar to that of females.

Specimens examined — 8 ♂♂ collected, 8 ♂♂ measured. Langevin – Jacqueline Waterfall (aasl 5 m, Long 55°64'40" E, Lat 21°38'69" S), 2 ♂♂ on *C. equisetifolia*, 19/7/2017; Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 2 ♂ on *C. retusa*, 27/2/2017; 4 ♂♂ + 1 im. on *P. hysterophorus*, 30/3/2017.

Type material — Eight paratype males in total. Three paratype males deposited in Montpellier SupAgro – INRA Acarology collection, Montpellier and five paratype males deposited in Bassin-Plat CIRAD Research station collection in La Réunion.

Remarks — This combination of characters of the male of this species are not unique and do not allow to distinguish it from all males of other species of *Neoseiulus* belonging to the *cucumeris* and *paraki* species sub-groups without collected females of the species. The male peritreme is shorter than the female peritreme. Other characters are very similar.

Neoseiulus longispinosus (Evans)

Typhlodromus longispinosus Evans 1952: 413; Evans 1953: 465; Womersley 1954: 177; Ehara 1958: 55.
Typhlodromus (*Amblyseius*) *longispinosus*, Chant 1959: 74.
Amblyseius longispinosus, Corpuz & Rimando 1966: 129; Schicha 1975: 103.
Neoseiulus longispinosus, Moraes *et al.* 1986: 85; 2000: 245; Chant & McMurtry 2003a: 37; Moraes *et al.* 2004a: 129; Chant and McMurtry 2007: 29.

This species belongs to the *barkeri* species group like *N. barkeri* (see above). It belongs to the *womersleyi* species subgroup as the calyx is markedly constricted at the junction with the atrium, the atrium is deeply forked at the junction with the major duct, and the major duct, atrium and calyx are not of the same width (Chant and McMurtry 2003a).

This species is distributed in many countries of the world, mainly in tropical areas (Moraes *et al.* 2000; Mailloux *et al.* 2010; Kreiter *et al.* 2013, 2018 a, c; Demite *et al.* 2019). It was found rarely in surveys made in Guadeloupe, Martinique and La Réunion except in studies on companion plants in citrus orchards (Mailloux *et al.* 2010; Kreiter *et al.* 2013, 2018c; Le Bellec *et al.*, unpub. data). This species seems actually to be more common on weeds with populations of tetranychid mites. *Neoseiulus longispinosus,* a type II phytoseiid predatory mite, as is *N. californicus* (McMurtry *et al.* 2013), has received increasing attention in Asia for the control of different spider mites (of *Eutetranychus*, *Oligonychus*, and *Tetranychus*) since 2010 (Nusartlert *et al.* 2011). The feeding, development, predation, cannibalism, intra-guild predation and behaviour have thus been extensively studied by several authors (see for example Luong *et al.* 2017) for pest control purposes. *Neoseiulus longispinosus* is well-known as a BCA sell in several countries in the world for the management of spider mites. The recent results of Huyen *et al.*(2017) show that at least in controlled laboratory conditions, *N. longispinosus* is a potential biological control agent against the citrus red spider mite *P. citri*.

This is the first record of this species for La Réunion Island.

Specimens examined:37 ♀♀ + 1 ♂ + 4 im. in total, 18 ♀♀ + 1 ♂ measured. Saint-Paul – Savannah (aasl 61 m, Long 55°29'43" E, Lat 21°20'41" S), 8 ♀♀ in flowers of *Phaseolus vulgaris* L. 28/07/2015; Saint-Pierre – Eastern entrance of the city (aasl 61 m, Long 55°29'43" E, Lat 21°20'41" S), 1 ♀ on *Ricinus communis* L., 16/12/2015; Ravine des Cabris – Ligne des Bambous, Lassay (aasl 221 m, Long 55°29'38" E, Lat 21°17'17" S), 1 ♀ on *Solanum torvum* Swartz, 2/12/2016; 1 ♀ + 1 ♂ + 1 im. on *Mirabilis jalapa* L., 4/12/2016; Saint-Pierre – Bassin Martin, ARMEFLHOR Station (aasl 450 m, Long 55°31'9" E, Lat 21°18'14" S), 11 ♀♀ on *Fragaria* sp. + *A. viridis*, 18/1/2017; Saint-Gilles – Pépinières du Théâtre (aasl 70 m, Long 56°13'58" E, Lat 21°2'50" S), 1 ♀ on *A. viridis*, 14/2/2017; Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 1 ♀ in plot H, 16/12/2016; 1 ♀ on *B. pilosa*, 2 ♀♀ + 1 im. on *M. repens*, 1 ♀ on *Ipomoea obscura* (L.), 1 ♀ on *Teramnus labialis* (L.f.), 12/2/2017; 1 ♀ + 2 im. on *I. obscura*, 1 ♀ on *Digitaria radicosa* (J. Presl), 30/3/2017; 6 ♀♀ in plots CC, M, HM and H, 3 and 6/04/2017.

Remarks: measurements of specimens of La Réunion females and males (Table 6) overlap with those obtained for populations of various countries. Measurements are slightly greater than those obtained on specimens of F.C.I. except for setae *j4, J2, z5, StIV*. On Comoros specimens, setae are longer except sternal shield length (*st1-st3*), inguinal sigilla (metapodal plates) and of macrosetae of basitarsus IV.

Neoseiulus lula (Pritchard & Baker)

Amblyseius (*Amblyseius*) *lula* Pritchard & Baker, 1962: 239.
Neoseiulus lula, Schicha 1981b: 212; Moraes *et al.* 1986: 87; Chant & McMurtry 2003a: 27; Moraes *et al.* 2004a: 130; Chant & McMurtry 2007: 29.
Amblyseius (*Amblyseius*) *insignitus* van der Merwe, 1968: 138 (synonymy according to Ueckermann & Loots, 1988).

Like *N. baraki* (see above), *N. lula* belongs to the *paspalivorus* species group (Chant and McMurtry 2003a).

The biology of this species remains unknown.

It is distributed in several countries and islands of sub-Saharan Africa but also in Cuba (Moraes *et al.* 2004a).

This is the first record of this species for La Réunion Island.

Specimens examined: a single ♀, measured. Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 1 ♀ on *Chrysopogon zizanioides* (L.), 2/3/2017.

Remarks: the measurements of the single female of *Neoseiulus lula* (Table 7) fit well measurements of specimens of the original description from Central Africa (Schicha 1981b) and those of specimens from Africa (Zannou *et al.* 2006), except for *j6* and *S2* which are smaller (>20 %) in the single specimen of La Réunion. Specimens from Africa (Zannou *et al.* 2006) have longer *Z4* but a reduced ventrianal shield. Specimens from South Africa and Madagascar

Table 6 Character measurements of adult females and one adult male of *Neoseiulus longispinosus* collected in this study with those in previous studies (localities followed by the number of specimens measured).

	♀								♂		
Characters	**La Réunion**	**FCI**	**Comoros**	**Martinique**	**Sri Lanka**	**Taiwan**	**Thailand**	**Holotype Indonesia**	**La Réunion**	**F.C.I.**	**Paratype Indonesia**
	18, this study	7	1	8	3	?	3	1	1, this study	5	1
Dsl	**320** (278 – 348)	332 (308 – 398)	380	321 (295 – 340)	321 (313 – 338)	-	330 (315 – 340)	332	**248**	247 (224 – 269)	231
Dsw	**183** (150 – 205)	179 (154 – 200)	192	168 (150 – 183)	187 (175 – 208)	-	186 (178 – 195)	173	**170**	160 (136 – 173)	138
j1	**18** (15 – 20)	18 (16 – 22)	20	16 (13 – 18)	18 (17 – 19)	17	19 (18 – 21)	14	**15**	14 (13 – 16)	9
j3	**62** (53 – 73)	59(52 – 64)	69	58 (48 – 63)	62 (61 – 64)	58	61 (56 – 68)	51	**50**	44 (40 – 48)	43
j4	**55** (48 – 60)	59 (52 – 65)	70	56 (50 – 65)	58 (56 – 60)	59	58 (54 – 62)	49	**45**	43 (42 – 43)	39
j5	**66** (58 – 73)	69 (64 – 75)	78	66 (60 – 73)	70 (69 – 71)	-	69 (65 – 72)	59	**48**	52 (50 – 53)	43
j6	**73** (65 – 83)	72 (68 – 75)	78	68 (60 – 83)	70 (68 – 72)	-	71 (68 – 73)	64	**53**	52 (50 – 53)	46
J2	**74** (68 – 83)	76 (73 – 78)	88	76 (68 – 88)	77 (75 – 79)	-	74 (68 – 81)	66	**55**	56 (53 – 61)	54
J5	**8** (6 – 10)	9 (8 – 11)	10	9 (8 – 10)	8	-	9 (7 – 12)	10	**8**	6 (5 – 6)	2
r3	**59** (48 – 78)	57 (49 – 62)	75	54 (45 – 63)	55 (55 – 56)	-	61 (50 – 67)	54	**35**	32 (24 – 40)	32
R1	**61** (54 – 80)	61 (57 – 65)	70	57 (50 – 63)	60 (59 – 62)	-	63 (55 – 70)	58	**38**	34 (32 – 37)	32
s4	**82** (70 – 88)	77 (73 – 80)	-	78 (73 – 88)	82 (80 – 83)	72	81 (76 – 85)	75	**63**	62 (59 – 66)	57
S2	**75** (68 – 85)	72 (68 – 76)	88	69 (63 – 76)	73 (70 – 79)	70	73 (68 – 80)	67	**55**	52 (50 – 54)	46
S4	**56** (43 – 68)	57 (48 – 76)	63	52 (45 – 58)	59 (57 – 62)	58	61 (56 – 68)	49	**40**	30 (29 – 32)	22
S5	**17** (15 – 18)	16 (14 – 16)	18	14 (13 – 15)	21 (19 – 23)	17	20 (18 – 25)	15	**15**	14 (13 – 16)	14
z2	**67** (56 – 75)	65 (62 – 68)	75	64 (58 – 70)	69 (68 – 70)	62	66 (62 – 70)	58	**48**	44 (35 – 48)	45
z4	**73** (65 – 80)	69 (67 – 73)	78	70 (63 – 87)	73 (73 – 75)	65	71 (68 – 75)	58	**50**	52 (48 – 54)	49
z5	**27** (23 – 33)	35 (32 – 40)	38	31 (28 – 35)	32 (32 – 38)	-	31 (25 – 36)	-	**28**	27 (24 – 32)	-
Z1	**75** (65 – 85)	75 (72 – 80)	83	74 (68 – 80)	77 (76 – 78)	-	75 (71 – 78)	67	**55**	56 (50 – 58)	46
Z4	**70** (63 – 75)	71 (67 – 75)	78	69 (63 – 78)	72 (71 – 73)	65	71 (65 – 76)	68	**53**	55 (48 – 59)	45
Z5	**81** (73 – 88)	80 (78 – 81)	85	77 (65 – 80)	80 (80 – 81)	70	78 (72 – 81)	72	**58**	57 (56 – 59)	57
st1-st1	**47** (43 – 50)	-	48	46 (45 – 50)	-	-	-	-	**43**	-	-
st2-st2	**58** (55 – 60)	55 (49 – 57)	55	54 (53 – 55)	53 (50 – 55)	-	59 (57 – 60)	-	**53**	-	-
st3-st3	**71** (68 – 78)	60 (59 – 62)	60	58 (55 – 60)	-	-	-	77	**53**	-	-
st1-st3 ♀ *st1-st5* ♂	**57** (55 – 60)	-	73	70 (68 – 73)	55 (53 – 56)	-	63 (57 – 85)	62	**103**	-	-
st4-st4	**71** (63 – 83)	-	85	72 (63 – 88)	-	-	-	-	**43**	-	-
st5-st5	**54** (50 – 58)	56 (52 – 60)	58	53 (50 – 63)	53 (51 – 54)	-	61 (55 – 64)	-	**35**	-	-
Lisl	**25** (20 – 30)	-	23	28 (23 – 33)	-	-	-	-			
Lisw	**3** (3 – 6)	-	3	3	-	-	-	-		Not applicable	
Sisl	**12** (10 – 18)	-	18	13 (10 – 15)	-	-	-	-			
Vsl	**114** (93 – 125)	115 (94 – 121)	125	111 (103 – 120)	106 (103 – 111)	-	123 (120 – 125)	97	**100**	106 (99 – 112)	101
Vsw *ZV2*	**86** (80 – 95)	86 (80 – 92)	90	84 (75 – 90)	91 (89 – 93)	-	97 (95 – 100)	87	**130**	135 (125 – 144)	130
Vsw *anus*	**69** (67 – 73)	75 (67 – 83)	78	70 (65 – 75)	75 (73 – 77)	-	-	-	**65**	-	-
JV5	**62** (55 – 70)	-	73	60 (55 – 63)	-	-	-	-	**35**	-	-
StIV	**79** (75 – 83)	80 (75 – 87)	75	81 (75 – 88)	68 (68 – 70)	74	74 (72 – 77)	80 – 87	**60**	66 (62 – 72)	-
Scl	**24** (13 – 35)	28 (25 – 30)	25	20 (17 – 25)	21 (20 – 21)	17	19 (17 – 22)	30		Not applicable	
Scw	**4** (3 – 10)	-	5 (	5	-	-	-	4			
Fdl	**24** (19 – 28)	25 (22 – 27)	23 (	24 (23 – 25)	22 (21 – 22)	-	23 (22 – 25)	-	**18**	-	-
No teeth Fd	**6**	4 – 5	-	4	5	-	-	-	-	-	-
Mdl	**24** (23 – 30)	25 (23 – 25)	23	24 (23 – 25)	25 (23 – 25)	-	26 (25 – 27)	-	**18**	-	-
No teeth Md	**2**	2	-	2	2	-	-	-	-	-	-
Shaft	Not applicable								**15**	12 (11 – 14)	21

Sources of measurements – For ♀♀: FCI (French Caribbean Islands): Moraes *et al.* (2000); Grande Comore: Kreiter *et al.* (2018b) (a mistake remains in the paper, 1 single female measured instead of 8 as indicated); Martinique: Kreiter *et al.* (2018c); Sri Lanka: Moraes *et al.* (2004b); Taïwan: Tseng (1983); Thailand: Oliveira *et al.* (2012); Holotype Indonesia: Schicha (1975). For ♂♂: FCI (French Caribbean Islands): Moraes *et al.* (2000); Paratype Indonesia: Schicha (1975). - : not provided.

(van der Merwe 1968; Ueckermann and Loots 1988) have in general greater dimensions than those obtained for specimens from La Réunion Island.

Neoseiulus paspalivorus De Leon

Typhlodromus paspalivorus De Leon, 1957: 143.
Amblyseius paspalivorus, Schicha 1981b: 210.
Neoseiulus paspalivorus, Muma & Denmark 1970: 110; Moraes *et al.* 1986: 92; Chant & McMurtry 2003a: 27; Moraes *et al.* 2004b: 137.

Like *N. baraki* and *N. lula*, *N. paspalivorus* belongs to the *paspalivorus* species group (see above) (Chant and McMurtry 2003a).

N. paspalivorus was found only on coconut and on fruits, in association with *A. guerreronis* (Moraes *et al.* 2004b). This species is a promising candidate for the biological control of the coconut eriophyid (Lawson-Balagbo *et al.* 2008).

This is the first record of this species for La Réunion Island.

Specimens examined: 15 ♀♀ + 3 ♂♂ in total, 8 ♀♀ measured + 3 ♂♂ measured. Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 1 ♀ on *D. ramularis*, 6 ♀♀ on *M. repens* + 2 ♂♂, 3 ♀♀ + 1 ♂ on *Cynodon dactylon* (L.), 1 ♀ on *Acanthospermum hispidum* DC., 1 ♀ on *L. leucocephala*, 20/2/2017; 3 ♀♀ in plots CC and HM, 3/04/2017.

Remarks: measurements of characters of the eight female and 3 male specimens (Table 8) fit well those obtained for populations of other countries, with only slight variations.

Neoseiulus scapilatus (van der Merwe)

Amblyseius (*Amblyseius*) *scapilatus* van der Merwe, 1965: 71.
Amblyseius scapilatus, Meyer & Rodriguez, 1966: 28.
Neoseiulus scapilatus, Moraes *et al.* 1986: 95; McMurtry & Moraes 1991: 26; Chant & McMurtry 2003a: 37; Moraes *et al.* 2004a: 142; Chant & McMurtry 2007: 31; El-Banhawy & Knapp 2011: 12.

Like *N. barkeri* and *N. longispinosus*, *N. scapilatus* belongs to the *barkeri* species group (see above) (Chant and McMurtry 2003a).

Quilici et al. (2000) have collected before this species in La Réunion that is distributed in several countries of sub-Saharan Africa. Exact indications of locations were provided but without any measurements of specimens collected. Measurements of specimens collected during this study are provided in table 9. The biology of this species remains unknown.

Specimens examined: 11 ♀♀ + 1 ♂ in total, all measured. Le Tampon – Grand Tampon, Janick Bénard farm (aasl 861 m, Long 55°32'90" E, Lat 21°12'80" S), 1 ♀ on *Lantana camara* L., 9/12/2015; 1 ♀ on *Ageratum conyzoides* (L.) and 1 ♀ + 1 im. on *Raphanus raphanistrum* L.; 24/5/2016; 2 ♀♀ on *Bromus catharticus* Vahl, 1 ♀ on *Conyza sumatrensis* (S.F. Blake), 9/1/2017; Petite Île – Piton Bloc, Yébo Luguy farm (aasl 973 m, Long 55°34'64" E, Lat 21°18'64" S), 3 ♀♀ on *B. catharticus*, 18/10/2016; 1 ♀ + 1 ♂ on *Pteridium aquilinum* (L.), 9/1/2017; Le Tampon – Ligne des 400 (aasl 463 m, Long 55°30'36" E, Lat 21°17'24" S), 1 ♀ on *Ipomoea* sp., 10/1/2017.

Remarks: measurements of morphological characters of *N. scapilatus* female specimens from La Réunion (Table 9) are very close from measurements for specimens from neighbouring countries, except for specimens from South Africa that are larger (van der Merwe 1965). La Réunion specimens have slightly shorter macrosetae.

For the male (Table 9), some setae (*j3*, *r3*, *S4*, *z5*, *JV5*) or dimensions (*st3-st3*, *st1-st5*) are shorter.

Table 7 Character measurements of an adult female of *Neoseiulus lula* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	La Réunion	Africa	Central Africa	Holotype Congo	South-Africa Madagascar	South-Africa
	1, this study	3	1	1	2?	1
Dsl	**385**	386 (381 – 393)	381	389	397	377
Dsw	**188**	196 (182 – 211)	157	191	195	204
j1	**23**	21 (19 – 23)	21	19	24	21
j3	**23**	23 (22 – 24)	23	22	24	21
j4	**15**	15 (14 – 16)	15	14	16	12
j5	**15**	14 (13 – 16)	14	14	16	13
j6	**13**	18 (18 – 19)	17	17	16	17
J2	**18**	19 (19 – 20)	20	18	21	18
J5	**13**	11 (10 – 13)	14	13	16	11
r3	**20**	21 (19 – 22)	21	24	24	20
R1	**20**	22 (20 – 24)	21	21	24	20
s4	**25**	25 (23 – 27)	25	25	27	22
S2	**20**	27 (25 – 29)	27	25	29	25
S4	**25**	28 (26 – 30)	26	28	29	24
S5	**25**	27 (26 – 29)	28	25	29	22
z2	**18**	20(19 – 21)	19	19	21	19
z4	**20**	21 (20 – 22)	19	20	21	17
z5	**15**	16 (15 – 16)	15	16	16	14
Z1	**19**	21 (19 – 22)	20	24	24	20
Z4	**28**	35 (30 – 43)	25	35	34	27
Z5	**65**	65 (64 - 66)	65	65	70	62
st1-st1	**48**	-	-	-	-	-
st2-st2	**63**	61 (58 – 64)	67	59	-	-
st3-st3	**70**	-	-	-	67	-
st1-st3	**75**	77 (77 – 78)	78	78	92	-
st4-st4	**68**	-	-	-	-	-
st5-st5	**70**	67 (62 – 70)	-	66	77	-
Lisl	**28**	-	28	-	-	-
Lisw	**5**	-	-	-	-	-
Sisl	**10**	-	10	-	-	-
Vsl	**138**	107 (102 – 110)	135	138	142	-
Vsw *ZV2*	**110**	85 (77 – 91)	109	107	107	-
Vsw *anus*	**88**	-	-	86	-	-
JV5	**38**	-	35	-	40	-
StIV	**53**	56 (53 – 59)	54	55	65	50
Scl	**3**	5	2	-	5	-
Scw	**12**	11 (11 – 12)	12	-	14	-
Fdl	**38**	32	35	-	-	-
No teeth Fd	**8**	8	-	-	6 - 7	-
Mdl	**30**	35	35	-	-	-
No teeth Md	**1**	1	-	-	0?	-

Sources of measurements – Africa (Benin 2♀♀, Tanzania 1♀) & Holotype Congo: Zannou et al. (2006); Central Africa: Schicha (1981b); South Africa-Madagascar (identified as N. insignitus, synonymized by Ueckermann & Loots 1988): van der Merwe (1968); South Africa: Ueckermann & Loots (1988); - : not provided.

Neoseiulus teke Pritchard & Baker

Amblyseius (*Amblyseius*) *teke* Pritchard & Baker, 1962: 239.
Amblyseius teke, Meyer & Rodrigues 1966: 30; Moraes *et al.* 1989a: 83; Moraes *et al.* 1989b: 97.
Neoseiulus teke, Moraes *et al.* 1986: 98; Chant & McMurtry 2003a: 37; Moraes *et al.* 2004a: 147; Chant & McMurtry 2007: 31.
Amblyseius (*Amblyseius*) *bibens* Blommers 1973: 111 (synonymy according to Ueckermann & Loots 1988).

Like *N. barkeri*, *N. longispinosus* and *N. scapilatus*, *N. teke* belongs to the *barkeri* species group and like *N. longispinosus* and *N. scapilatus*, it belongs to the *womersleyi* species subgroup (see above) (Chant and McMurtry 2003a).

This species is found in sub-Saharan Africa often associated with *Mononychellus tanajoa* (Bondar), the cassava green mite (CGM). It has been studied for its potential as BCA against the CGM. Nwilene and Nachman (1996) studied its reproduction characteristics on *M. tanajoa*. It was more efficient than *Iphiseius degenerans* (Berlese), but seems not efficient enough in

Table 8 Character measurements of adult females and males of *Neoseiulus paspalivorus* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	♀						♂				
	La Réunion	**Benin**	**Ghana**	**Philippines**	**Sri Lanka**	**Holotype Florida**	**La Réunion**	**Benin**	**Brazil**	**Ghana**	**Holotype Florida**
	8, this study	20	20	1	7	**1**	3, this study	20	20	20	1
Dsl	**343** (328 – 375)	343 (336 – 352)	338 (333 – 342)	285	322 (307 –340)	334	**271** (268 – 275)	257 (250 – 269)	257 (241 – 263)	257 (253 – 263)	247
Dsw	**135** (125 – 143)	138 (130 – 146)	139 (130 – 146)	134	134 (127 – 142)	138	**149** (143 – 165)	125 (120 – 127)	124 (120 – 127)	118 (114 – 120)	95
j1	**12** (10 – 13)	11 (10 – 12)	12 (10 – 12)	7-9	10 (9 – 11)	11	**10**	10 (8 – 10)	10 (9 – 10)	10 (9 – 11)	8
j3	**12** (10 – 14)	11 (10 – 12)	11 (10 – 12)	8-13	10 (8 – 11)	11	**10** (10 – 11)	10 (8 – 11)	10 (9 – 11)	10 (9 – 11)	8
j4	**9** (8 – 10)	9 (8 – 10)	9 (8 – 11)	7-9	9 (8 – 10)	9	**10**	8 (6 – 9)	9 (7 – 9)	8 (6 – 9)	8
j5	**9** (8 – 10)	9 (8 – 10)	10 (8 – 11)	7-9	9 (8 – 10)	10	**9** (8 – 10)	8 (6 – 9)	8 (7 – 9)	8 (7 – 9)	8
j6	**9** (8 – 13)	10 (9 – 11)	10 (9 – 11)	7-9	10 (9 – 15)	11	**10** (9 – 10)	9 (7 – 10)	9 (7 – 10)	9 (8 – 11)	8
J2	**10** (9 – 10)	11 (9 – 12)	11 (10 – 12)	7-9	10 (8 – 11)	11	**10** (9 – 10)	9 (8 – 11)	10 (9 – 11)	10 (8 – 10)	8
J5	**11** (10 – 13)	9 (8 – 10)	10 (8 – 11)	7-9	8 (7 – 9)	9	**8** (8 – 9)	7 (6 – 8)	8 (6 – 9)	7 (6 – 8)	8
r3	**12** (10 – 13)	12 (10 – 14)	14 (12 – 15)	8-10	10 (8 – 11)	11	**9**	10 (9 – 10)	11 (10 – 12)	10 (9 – 11)	8
R1	**11** (9 – 13)	11 (9 – 12)	11 (10 – 12)	8-10	10 (9 – 10)	10	**12** (11 – 13)	9 (8 – 10)	10 (9 – 11)	10 (8 – 10)	8
s4	**12** (10 – 13)	13 (11 – 14)	12 (11 – 15)	8-13	12 (11 – 12)	12	**12** (11 – 13)	11 (9 – 11)	11 (10 – 11)	11 (10 – 12)	10
S2	**12** (10 – 13)	14 (12 – 15)	14 (12 – 15)	8-13	12 (10 – 13)	14	**11** (10 – 13)	11 (10 – 12)	11 (10 – 12)	12 (11 – 13)	9
S4	**14** (10 – 15)	15 (14 – 16)	15 (14 – 16)	8-13	14 (13 – 15)	15	**13** (12 – 13)	12 (11 – 14)	12 (11 – 13)	13 (11 – 15)	12
S5	**17** (15 – 20)	16 (15 – 18)	19 (17 – 20)	16	18 (16 – 20)	19	**10** (9 – 10)	13 (11 – 14)	15 (13 – 16)	15 (13 – 16)	8
z2	**10** (9 – 10)	9 (8 – 10)	11 (9 – 12)	8-13	10 (9 – 10)	11	**9** (8 – 10)	8 (6 – 9)	9 (7 – 10)	9 (8 – 10)	8
z4	**10** (8 – 10)	10 (9 – 11)	11 (9 – 12)	8-13	10 (9 – 11)	11	**10**	9 (8 – 10)	10 (9 – 11)	10 (9 – 11)	8
z5	**10** (9 – 10)	9 (9 – 10)	10 (9 – 11)	8	9 (8 - 9)	9	**9** (8 – 9)	7 (6 – 9)	8 (7 – 9)	8 (7 – 9)	8
Z1	**12** (10 – 13)	11 (10 – 14)	11 (9 – 12)	8-13	10 (9 – 11)	11	**12** (12 – 13)	10 (8 – 10)	10 (9 – 10)	9 (7 – 11)	7
Z4	**16** (13 – 20)	17 (15 – 18)	17 (15 – 19)	15	15 (13 – 17)	17	**17** (15 – 18)	14 (12 – 15)	15 (14 – 16)	14 (13 – 16)	12
Z5	**49** (45 – 51)	55 (51 – 56)	50 (48 – 52)	52	48 (45 – 52)	52	**40** (38 – 42)	40 (36 – 44)	40 (37 – 45)	41 (38 – 44)	39
st1-st1	**41** (40 – 43)	-	-	-	-	-	**38**	-	-	-	-
st2-st2	**51** (48 – 55)	52 (47 – 54)	51 (47 – 54)	-	48 (45 – 53)	-	**44** (40 – 48)	40 (38 – 41)	42 (41 – 44)	40 (38 – 41)	-
st3-st3	**53** (48 – 60)	-	-	55	-	55	**45** (40 – 50)	-	-	-	-
st1-st3 ♀ / *st1-st5* ♂	**81** (70 – 93)	81 (76 – 82)	81 (79 – 86)	78	74 (72 – 76)	84	**117** (112 – 122)	-	-	-	-
st4-st4	**63** (58 – 70)	-	-		-	-	**36** (31 – 40)	-	-	-	-
st5-st5	**55** (53 – 58)	60 (57 – 63)	58 (57 – 60)	67	50 (49 – 53)	-	**31** (29 – 33)	34 (32 – 35)	33 (31 – 35)	31 (28 – 35)	-
Lisl	**38** (35 – 43)	-	-	-	-	-					
Lisw	**3**	-	-	-	-	-			Not applicable		
Sisl	**7** (5 – 10)	-	-	-	-	10					
Vsl	**103** (100 – 110)	104 (98 – 108)	108 (101 – 111)	105	103 (95 – 115)	170	**98** (100 – 105)	93 (89 – 98)	93 (85 – 95)	94 (92 – 98)	90
Vsw *ZV2*	**86** (80 – 90)	81 (79 – 82)	81 (79 – 85)	81	78 (70 – 85)	86	**143** (138 – 160)	118 (111 – 127)	117 (108 – 120)	117 (111 – 123)	108
Vsw *anus*	**77** (75 – 80)	74 (70 – 76)	61 (54 – 73)	-	73 (67 – 80)	-	**97** (100 – 102)	77 (70 – 82)	79 (73 – 82)	75 (70 – 79)	-
JV5	**25** (23 – 28)	-	-	24	22 (17 – 28)	-	**20** (19 – 20)	-	-	-	-
StIV	**18** (15 – 20)	18 (16 – 19)	18 (16 – 20)	21	19 (17 – 21)	-	**14** (15 – 17)	15 (14 – 16)	-	16 (15 – 17)	**15**
Scl	**9** (8 – 10)	8 (6 – 9)	8 (6 – 9)	-	7	2					
Scw	**7** (7 – 8)	7 (6 – 9)	7 (5 – 7)	-	-	5			Not applicable		
Fdl	**18** (15 – 20)	18 (17 – 19)	18 (16 – 19)	-	25 (23 – 29)	15	**15**	12 (11 – 12)	12 (11 – 14)	13 (11 – 14)	-
No teeth Fd	**6**	-	-	-	6	6	**2**	-	-	-	-
Mdl	**22** (20 – 25)	24 (23 – 25)	23 (22 – 25)	-	23 (20 – 26)	-	**18**	18 (16 – 19)	18 (16 – 19)	17 (16 – 19)	-
No teeth Md	**1**	-	-	-	1	-	**1**	-	-	-	-
Shaft			Not applicable				**18** (15 – 20)	12 (11 – 12)	12 (11 – 12)	12 (11 – 12)	13

Sources of measurements – For ♀♀: Benin and Ghana: Famah Sourassou *et al.* (2011); Philippines: Schicha & Corpuz-Raros (1992); Sri Lanka: Moraes et al. (2004b); Hototype Florida (USA): De Leon (1957) and Schicha (1981b). For ♂♂: Benin, Brazil and Ghana: Famah Sourassou *et al.* (2011); Hototype Florida (USA): De Leon (1957) and Schicha (1981b); Philippines: Schicha & Corpuz-Raros (1992). - : not provided.

Table 9 Character measurements of adult females and one adult male of *Neoseiulus scapilatus* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	♀				♂	
	La Réunion	**Africa**	**Kenya**	**South Africa**	**La Réunion**	**South Africa**
	11, this study	10	1	6	1, this study	1?
Dsl	**313** (305 – 325)	330 (312 – 345)	280	322 – 336	**245**	270
Dsw	**197** (163 – 213)	192 (188 – 203)	140	190 – 210	**170**	185
j1	**18** (15 – 20)	20 (18 – 23)	16	18 – 22	**15**	15
j3	**26** (18 – 33)	28 (25 – 30)	25	30 – 34	**18**	25
j4	**16** (14 – 18)	17 (14 – 19)	12	18 – 22	**15**	17
j5	**14** (12 – 16)	16 (14 – 18)	13	18 – 22	**13**	17
j6	**13** (11 – 15)	16 (14 – 18)	12	18 – 22	**13**	15
J2	**15**	18 (16 – 21)	14	18 – 22	**17**	17
J5	**12** (9 – 16)	13 (10 – 19)	15	10 – 14	**10**	11
r3	**22** (20 – 24)	23 (20 – 28)	-	24 – 27	**15**	23
R1	**16** (10 – 21)	22 (18 – 25)	14	22 – 25	**15**	15
s4	**42** (38 – 48)	43 (38 – 46)	32	44 – 48	**33**	31
S2	**38** (33 – 43)	37 (30 – 43)	32	40 – 44	**30**	31
S4	**28** (23 – 33)	29 (23 – 33)	24	30 – 34	**20**	25
S5	**21** (18 – 25)	20 (15 – 23)	16	22 – 26	**18**	18
z2	**24** (21 – 28)	24 (22 – 26)	16	30 – 34	**18**	18
z4	**28** (25 – 35)	27 (24 – 30)	23	30 – 34	**21**	23
z5	**14** (13 – 18)	16 (14 – 20)	12	18 – 22	**13**	17
Z1	**20** (18 – 23)	22 (19 – 26)	21	25 – 28	**18**	20
Z4	**56** (50 – 64)	60 (56 – 63)	48	58 – 64	**43**	43
Z5	**61** (55 – 71)	64 (54 – 73)	58	62 – 68	**43**	42
st1-st1	**54** (53 – 58)	-	-	-	**45**	-
st2-st2	**64** (58 – 68)	65 (62 – 70)	58	74	**53**	-
st3-st3	**74** (68 – 78)	-	-	-	**58**	92
st1-st3 ♀ / *st1-st5* ♂	**60** (55 – 70)	59 (56 – 61)	58	70	**98**	131
st4-st4	**69** (60 – 75)	-	-	-	**45**	-
st5-st5	**62** (60 – 65)	60 (58 – 64)	60	75 – 80	**30**	-
Lisl	**23** (18 – 28)	-	-	-		
Lisw	**4** (3 – 6)	-	-	-	Not applicable	
Sisl	**10** (5 – 13)	-	-	-		
Vsl	**111** (100 – 125)	117 (110 – 125)	92	112 – 122	**100**	119
Vsw *ZV2*	**102** (88 – 113)	108 (100 – 128)	87	100 – 108	**132**	132
Vsw *anus*	**88** (70 – 100)	90 (83 – 95)	78	-	**75**	-
JV5	**50** (38 – 67)	-	40	-	**23**	31
SgeIV	**32** (26 – 38)	36 (30 – 42)	32	32 – 36	**23**	23
StIV	**61** (53 – 68)	72 (63 – 80)	48	66 – 70	**53**	54
Scl	**32** (26 – 38)	31 (30 – 35)	31	47	Not applicable	
Scw	**12** (5 – 25)	-	10	-		
Fdl	**31** (28 – 35)	28 (28 – 29)	-	28	**23**	-
No teeth Fd	**4**	4	-	-	-	-
Mdl	**30** (28 – 33)	32 (31 – 33)	-	33	**23**	-
No teeth Md	**1**	1	-	-	-	-
Shaft	Not applicable					-

Sources of measurements – For ♀♀: Africa (Benin: 1♀; Burundi 5♀♀, Kenya 1♀, Malawi 1♀, Rwanda 1♀, Uganda 1♀): Zannou *et al.* (2006); Kenya: El-Banhawy and Knapp (2011a); South Africa: van der Merwe (1965). For ♂♂: South Africa: Ueckermann & Loots (1988). - : not provided.

field conditions (Nwilene and Nachman 1996). Quilici *et al.*(2000) have collected this species before in La Réunion. Exact indications of locations were provided in the paper but without any measurements of specimens collected. Measurements of specimens collected during this study are provided in table 10.

Specimens examined: 12 ♀♀ in total + 6 ♂♂ + 2 im., 10 ♀♀ + 2 ♂♂ measured. Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25"

Table 10 Character measurements of adult females and males of *Neoseiulus teke* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	♀						♂		
	La Réunion	**Africa**	**Kenya**	**Madagascar**	**South Africa**	**Holotype Congo**	**La Réunion**	**Madagascar**	**South Africa**
	10, this study	10	2	1	5	1	2, this study	5	2
Dsl	**307** (293 – 328)	308 (293 – 320)	295	340	332 – 341	348	**225 – 230**	260	270 – 285
Dsw	**165** (155 – 173)	172 (162 – 186)	160	200	190 – 203		**150**	170	197 – 200
j1	**15** (13 – 18)	18 (16 – 19)	18	20	19 – 23		**10 – 13**	15	15 – 18
j3	**46** (38 – 53)	44 (35 – 50)	39	50	62 – 67	61	**25 – 33**	34	40 – 46
j4	**25** (23 – 28)	30 (23 – 36)	39	30	38 – 45	42	**18 – 20**	18	26 – 34
j5	**39** (35 – 43)	42 (35 – 48)	39	45	47 – 54		**25 – 30**	28	34 – 40
j6	**47** (45 – 53)	48 (43 – 53)	42	54	62 – 66	60	**28 – 35**	30	40 – 46
J2	**55** (50 – 58)	53 (45 – 59)	48	65	68 – 75	68	**33 – 38**	35	40 – 46
J5	**11** (10 – 13)	11 (10 – 12)	9	10	12 – 14		**8 – 13**	9	11
r3	**44** (40 – 48)	40 (34 – 46)	37	50	54 – 66	61	**23 – 28**	30	26 – 34
R1	**42** (40 – 45)	37 (27 – 48)	37	48	54 – 66	66	**23**	24	26 – 34
s4	**60** (55 – 65)	60 (54 – 64)	55	66	75 – 82	71	**43 – 48**	45	54 – 59
S2	**64** (60 – 68)	61 (56 – 67)	58	70	72 – 80		**40 – 45**	45	46 – 54
S4	**47** (43 – 60)	43 (40 – 48)	39	50	56 – 63		**28 – 30**	27	31 – 34
S5	**36** (28 – 38)	32 (23 – 40)	34	40	46 – 52	48	**20 – 23**	25	25 – 31
z2	**51** (48 – 53)	49 (41 – 54)	46	56	66 – 71	62	**33 – 37**	32	42 – 49
z4	**50** (48 – 50)	51 (43 – 56)	48	54	68 – 75	65	**33 – 35**	38	42 – 49
z5	**25** (23 – 28)	29 (19 – 38)	35	25	33 – 44	42	**18**	15	20 – 28
Z1	**54** (50 – 58)	53 (45 – 62)	44	55	71 – 77	65	**33 – 40**	37	40 – 46
Z4	**57** (50 – 63)	60 (54 – 67)	55	66	66 – 74	-	**40 – 45**	42	46 – 54
Z5	**68** (65 – 73)	65 (59 – 74)	58	76	80 – 90	-	**45 – 50**	50	54 – 59
st1-st1	**44** (43 – 48)	-	-	-	-	-	**40**	-	-
st2-st2	**55** (53 – 58)	58 (56 – 63)	53	-	-	-	**50**	-	-
st3-st3	**67** (61 – 70)	-	-	-	63 – 67	-	**53**	-	-
st1-st3 ♀ / *st1-st5* ♂	**60** (55 – 63)	56 (53 – 58)	53	-	56 – 59	-	**95**	-	116 – 128
st4-st4	**66** (53 – 70)	-	-	-	-	-	**40 – 43**	-	-
st5-st5	**54** (50 – 58)	56 (51 – 63)	58	-	70 – 74	-	**35**	-	-
Lisl	**25** (23 – 28)	-	-	-	-	-			
Lisw	**3** (3 – 5)	-	-	-	-	-		Not applicable	
Sisl	**10** (8 – 10)	-	-	-	-	-			
Vsl	**109** (100 – 115)	111 (104 – 118)	105	125	115 – 122	108	**95 – 103**	115	112 – 131
Vsw *ZV2*	**90** (83 – 95)	97 (93 – 102)	80	100	95 – 100	95	**125 – 140**	-	139 – 145
Vsw *anus*	**71** (63 – 80)	-	-	-	-	-	**50**	-	-
JV5	**57** (55 – 63)	-	55	64	66 – 72	-	**28 – 33**	33	34 – 40
StIV	**69** (48 – 75)	66 (51 – 77)	65	75	75 – 78	72	**50 – 53**	54	54 – 63
Scl	**25** (23 – 28)	24 (22 – 27)	16	24	27	-			
Scw	**6** (5 – 13)	-	-	7	-	-		Not applicable	
Fdl	**24** (18 – 25)	24 (23 – 25)	-	24	24	-	**20**	19	-
No teeth Fd	**4**	4	7	3	4	-	**3-4?**	2	-
Mdl	**24** (20 – 28)	26 (25 – 27)	-	26	27	-	**18 – 20**	19	-
No teeth Md	**2**	2	2	2	2	-	**2?**	1	-
Shaft	Not applicable						**13**	12	-

Sources of measurements – For ♀♀: Africa (Burundi 1♀, Ghana 2♀♀, Kenya 3♀♀, Malawi 1♀, Mozambique 1♀, Rwanda 1♀, Sierra Leone 1♀): Zannou *et al.* (2006); Kenya: El-Banhawy & Knapp (2011a); Madagascar (Identified as *Amblyseius bibens* but synonymized by Ueckermann & Loots 1988): Blommers (1973); South Africa: van der Merwe (1968); Holotype Congo: Zannou et al. (2006). For ♂♂: Madagascar (Identified as *Amblyseius bibens* but synonymized by Ueckermann & Loots 1988): Blommers (1973); South Africa: Ueckermann & Loots (1988). - : not provided.

S), 1 ♀ + 1 im. on *M. repens*, 20/2/2017; 1 ♀ on *A. hispidum*, 1 ♀ + 1 im. on *M. repens*, 1 ♀ + 1 ♂ on *P. maximum*, 30/3/2017; 4 ♀♀ + 1 ♂ on *M. repens*, 3/4/2017; 2 ♀♀ + in plots HM, 1 ♀ + 1 ♂ in plot CC, 1 ♀ in plot H, 4/4/2017 and 6/4/2017.

Remarks: measurements of morphological characters of *N. teke* female and male specimens from La Réunion (Table 10) are very close from measurements for specimens from neighbouring countries, especially from specimens from various countries in Africa, except for the holotype (Zannou *et al.* 2006) and specimens from South Africa which are larger (van der Merwe 1965).

Tribe Kampimodromini Kolodochka

Kampimodromini Kolodochka 1998: 59; Chant & McMurtry, 2003b: 189; 2006b: 137; 2007: 33.

Subtribe Paraphytoseiina Chant & McMurtry

Paraphytoseiina Chant & McMurtry 2003b: 211.

Genus *Paraphytoseius* Swirskii & Shechter

Paraphytoseius Swirski & Shechter 1961: 113; Moraes *et al.* 1986:104; Chant & McMurtry 2003b: 216; Moraes *et al.* 2004a: 160; Chant & McMurtry 2007: 49.
Amblyseius (*Paraphytoseius*), Ueckermann & Loots 1987: 221.
Amblyseius (*Ptenoseius*), Pritchard & Baker1962: 295.
Proprioseius (*Paraphytoseius*), Karg 1983: 302.
Ptenoseius, Schuster & Pritchard 1963: 198.

Paraphytoseius horrifer (Pritchard & Baker)

Amblyseius (*Ptenoseius*) *horrifer* Pritchard & Baker, 1962: 295.
Amblyseius horrifer, Meyer & Rodrigues 1966: 30.
Amblyseius (*Paraphytoseius*) *horrifer*, van der Merwe 1968: 169.
Proprioseius (*Paraphytoseius*) *horrifer*, Karg 1983: 302.
Paraphytoseius horrifer, Moraes *et al.* 1986: 105; Beard 2001: 84; Chant & McMurtry 2003a: 37; Moraes *et al.* 2004a: 152; Chant & McMurtry 2007: 53.

In our specimens of this species, setae *S5* are absent. So accordingly with Chant and McMurtry (2003b) all specimens belong to the *orientalis* species group.

Accordingly with these previous authors, and with Moraes *et al.* (2007), we consider that *P. horrifer* and *P. orientalis* are different valid species. Our specimens with longer setae *s4*, *Z4*, *Z5*, and lacking a distinctly short, thick, spatulate macroseta on genu I.

This species is widely distributed in Sub-Saharan Africa and Madagascar. The biology of *P. horrifer* remains totally unknown.

This is the first mention of this species from La Réunion Island.

Specimens examined: 13 ♀♀ + 1 ♂ + 1 im. in total, 12 ♀♀ + 1 ♂ measured. Le Tampon – Ligne des 400 (aasl 463 m, Long 55°30’36” E, Lat 21°17’24” S), 1 ♂ + 2 im. on *Ipomoea purpurea* (L.), 11/2/2017; Ravine Langevin – Grand-Galet Waterfall (aasl 850 m, Long 55°21’33” E, Lat 21°17’47” S), 7 ♀♀ on *Desmodium incanum* DC., 11/12/2016; Forêt de Bélouve – Gîte (aasl 1500 m, Long 55°33’36” E, Lat 21°6’0” S), 1 ♀ on *Fuchsia boliviana* Carrière, 20/12/16; Cilaos – Village (aasl 991 m, Long 55°27’0” E, Lat 21°8’24” S), 1 ♀ on *Acalypha hispida* Burm. f., 8/1/17; Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29’18” E, Lat 21°19’25” S), 1 ♀ in plot BM, 23/8/2016; 1 ♀ on *M. coromandelianum*, 19/6/2017; 1 ♀ on *A. viridis*, 20/6/2017.

Remarks: even if lengths of setae seem very variable in *P. horrifer* in the literature (van der Merwe 1968; Moraes *et al.* 2007), measurements of morphological characters of La Réunion specimens (Table 11) agree well with measurements found in the literature, being however

slightly shorter for almost all characters compared with female and male specimens of South Africa (van der Merwe 1968).

Paraphytoseius orientalis (Narayanan, Kaur & Ghai)

Typhlodromus (*Amblyseius*) *orientalis* Narayanan, Kaur & Ghai 1960: 394.
Paraphytoseius orientalis, Moraes *et al.* 1986: 105; Chant & McMurtry 2003b: 220; Moraes *et al.* 2004a: 162, Chant & McMurtry 2007: 53.
Amblyseius ipomeai, Narayanan, Kaur & Ghai 1960: 394 (synonymy according to El-Banhawy 1984); *Paraphytoseius narayanani*, Ehara 1967: 67 (synonymy according to Ehara & Ghai, in Ehara 1967: 77); *Paraphytoseius multidentatus*, Swirski & Shechter 1961: 114 (synonymy according to Matthysse & Denmark 1981 in Denmark *et al.* 1999: 11).

As mentioned earlier, in our specimens of *Paraphytoseius* spp., setae *S5* are absent, all our specimens belong to the *orientalis* species group (Chant and McMurtry 2003b) and we consider that *P. horrifer* and *P. orientalis* are distinct, valid species.

Our specimens with shorter *s4*, *Z4* and *Z5* setae, having a distinctly short, thick, spatulate macroseta on genu I belong to *P. orientalis*.

This species is widely distributed in tropical and subtropical areas in South America, Africa and Asia. This species belongs to a genus included in the large polyphagous generalist group named type III phytoseiid mites (McMurtry and Croft 1997; McMurtry *et al.* 2013). Navasero and Navasero (2016) have studied the life history of *P. orientalis* on the broad mite (*P. latus*) as prey. The authors reported high predation rates on the eggs of *P. latus*, suggesting good potential for the control of this pest. Quilici et al. (2000) have collected before this species in La Réunion but provided no measurements. We herein provide measurements of specimens collected in La Réunion (Table 12).

Specimens examined: 20 ♀♀ + 1 ♂ + 1 im. in total, 5 ♀♀ + 1 ♂ measured. Saint-Pierre – Bassin Martin, Armefhor Station (aasl 450 m, Long 55°31'9" E, Lat 21°18'14" S), 8 ♀♀ + 1 ♂ on *Borago officinalis* L., 17/12/2015; Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 4 ♀♀ + 1 im. in plot BM, 2 ♀♀ in plot F, and 2 ♀♀ in plot H, 23/8/2016; 1 ♀ on *M. coromandelianum*, 19/6/2017; 1 ♀ on *A. viridis*, 20/6/2017; Ravine Langevin – Grand-Galet Waterfall (aasl 850 m, Long 55°21'33" E, Lat 21°17'47" S), 2 ♀♀ on *D. incanum*, 11/12/2016.

Remarks: measurements of morphological characters of La Réunion female and male specimens (Table 12) agree well with measurements of specimens from other countries found in the literature.

Tribe Phytoseiulini Chant & McMurtry

Phytoseiulini Chant & McMurtry 2006: 7.

Genus Phytoseiulus Evans

Phytoseiulus Evans 1952: 397.

Phytoseiulus persimilis Athias-Henriot

Phytoseiulus persimilis Athias-Henriot 1957: 347; Moraes *et al.* 1986: 109; Moraes *et al.* 2004a: 169; Chant & McMurtry 2006a: 20; 2007: 55.
Phytoseiulus (*Phytoseiulus*) *persimilis*, Wainstein 1962: 17.
Typhlodromus persimilis, Hirschmann 1962: 75.
Phytoseiulus riegeli Dosse 1958: 48 (synonymy according to Chant 1959); *Phytoseiulus tardi* Lombardini 1959: 166 (synonymy according to Kennett & Caltagirone 1968).

Table 11 Character measurements of adult females and one adult male of *Paraphytoseius horrifer* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	♀					♂	
	La Réunion	**Africa**	**Senegal**	**South Africa**	**Holotype**	**La Réunion**	**South Africa**
	12, this study	4	2	2	**Zaire**, 1	1, this study	2
Dsl	**295** (265 – 330)	300 (294 – 310)	300 – 304	318 – 339	298	**250**	260
Dsw	**153** (128 – 175)	158 (149 – 166)	163 – 170	165 – 176	166	**110**	140
j1	**33** (25 – 40)	38 (37 – 40)	35 – 38	39 – 42	38	**15**	
j3	**86** (78 – 100)	85 (80 – 88)	83 – 85	-	84	**58**	59
j4	**5** (3 – 5)	3	3 – 5	-	3	**4**	-
j5	**5** (3 – 5)	3	3 – 5	5	3	**4**	-
j6	**8** (5 – 10)	7 (6 – 8)	5 – 6	9	6	**7**	-
J5	**5** (3 – 8)	4 (3 – 5)	3 – 5	5	3	**3**	-
r3	**48** (45 – 58)	43 (10 – 45)	43 – 45	52	45	**30**	33
R1	**38** (30 – 45)	31 (27 – 41)	30 – 32	36	28	**18**	22
s4	**126** (110 – 148)	131 (122 – 139)	118 – 125	136 – 141	138	**80**	103
z2	**12** (9 – 13)	11 (10 – 12)	8 – 10	14	11	**10**	-
z4	**11** (9 – 13)	8 (6 – 11)	8 – 10	9	6	**10**	-
z5	**5** (3 – 8)	5 (4 – 5)	3 – 5	5	5	**5**	-
Z1	**7** (5 – 8)	7 (6 – 8)	7 – 9	5	5	**7**	-
Z4	**80** (70 – 88)	80 (77 – 84)	73 – 75	85 – 89	84	**45**	59
Z5	**109** (93 – 133)	114 (112 – 118)	95 – 100	122 – 127	116	**50**	75
st1-st1	**68** (55 – 73)	-	-	-	-	**53**	-
st2-st2	**71** (65 – 80)	73 (72 – 74)	68 – 69	78	69	**55**	-
st3-st3	**79** (73 – 85)	-	-	-	-	**63**	-
st1-st3 ♀ / *st1-st5* ♂	**68** (58 – 75)	66 (64 – 69)	68 – 70	92	63	**98**	-
st4-st4	**88** (75 – 98)	-	-	-	-	**55**	-
st5-st5	**86** (75 – 95)	83 (82 – 86)	85 – 88	87	84	**48**	-
Lisl	**30** (25 – 38)	-	-	-	-		
Lisw	**3**	-	-	-	-	Not applicable	
Sisl	**11** (10 – 13)	-	-	-	-		
Vsl	**99** (53 – 118)	103 (96 – 110)	113 – 115	117	115	-	122
Vsw *ZV2*	**59** (53 – 75)	68 (62 – 74)	68 – 70	70	75	**105**	120
Vsw *anus*	**61** (55 – 68)	62 (59 – 67)	65	-	63	**60**	-
JV5	**77** (70 – 85)	-	-	-	-	**50**	28
SgeII	**15** (13 – 15)	12 (11 – 13)	13 – 15	-	-	**13**	14
SgeIV	**27** (23 – 45)	25 (24 – 27)	28 – 30	28	24	**18**	23
StiIV	**36** (30 – 43)	37 (35 – 40)	32 – 38	47	34	**23**	34
StIV	**43** (38 – 47)	40 (38 – 43)	43 – 45	47	36	**30**	37
SttIV	**45** (43 – 48)	41 (39 – 42)	33 – 35	-	-	**30**	-
Scl	**3** (3 – 5)	4 (3 – 5)	-	25	4	Not applicable	
Scw	**10** (9 – 11)	12 (9 – 13)	-	10	-		
Fdl	**34** (23 – 50)	29	-	-	-	**20**	22
No teeth Fd	**11**	10 – 11	-	-	-	**5 ?**	8
Mdl	**32** (25 – 38)	34 (33 – 34)	-	-	-	**20**	22
No teeth Md	**2**	2 – 3	-	-	-	**1**	1
Shaft	Not applicable					**15**	18

Sources of measurements – For ♀♀: Africa (Benin 1♀, Kenya 1♀, Uganda 2♀♀): Moraes *et al.* (2007); Senegal: Kade *et al.* (2011); South Africa: van der Merwe (1968); Holotype Zaïre: Moraes *et al.* 1989). For ♂♂: South Africa: van der Merwe (1968). - : not provided.

Phytoseiulus persimilis is a Mediterranean/subtropical predatory mite, a type I species, i.e. a specialist predator of the *urticae* species group of the genus *Tetranychus* (McMurtry and Croft 1997; McMurtry *et al.* 2013). Considerable research has been conducted on this predator-prey interaction (see review by Kostiainen and Hoy 1996), and numerous biological control programs have used *P. persimilis* against *T. urticae* on a wide range of ornamental and vegetable crops. *Phytoseiulus persimilis* was the first greenhouse biological control agents available commercially and it is one of the most successful BCA in the world. It can also be used in temperate climates on open-field crops such as strawberries. Optimum conditions are 20-27 °C and relative humidity of 60-90 %. Cooler or warmer temperatures may have a negative effect on reproduction, development and efficiency of this predatory mite. This species is present in Mauritius (Kreiter *et al.* 2018a) and La Réunion probably because of its commercial introduction and uses in vegetable and ornamental greenhouses, dispersion of some specimens released and establishment in the environment. This species is actually reared and sold in La Réunion and commercialised in Mascareignes since a long time (Quilici, personal communication). *Phytoseiulus persimilis* was already known from La Réunion (Quilici *et al.* 1997, 2000). Exact indications of locations were provided in these papers but without any

Table 12 Character measurements of adult females and one adult male of *Paraphytoseius orientalis* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	♀								♂				
	La Réunion 5, this study	**Africa 1** ?	**Africa 2** 5	**Hong-Kong** 7	**Kenya** 5	**Madagascar** ?	**Mauritius** 8	**Paratype Hong-Kong**	**La Réunion** 1, this study	**Madagascar** ?	**Philippines** 2	**Taiwan** 2	**Thailand** 4
Dsl	**266** (260 – 283)	291 (252 – 317)	291 (280 – 304)	259 – 305	250	280 – 295	290 (276–300)	306	**250**	220	197	220 (209 – 231)	230
Dsw	**150** (145 – 150)	152 (127 – 173)	159 (149 – 168)	-	150	155 – 160	146 (140–149)	165	**110**	140	91	93 (90 – 96)	160
j1	**31** (28 – 35)	35 (31 – 41)	32 (29 – 37)	36 (30 – 38)	40	30 – 36	35 (34–36)	36	**23**	27	27	23 (14 – 26)	25
j3	**83** (81 – 88)	84 (72 – 91)	83 (72 – 90)	79 (76 – 81)	80	79 – 89	83 (78–89)	81	**50**	55	60	58 (49 – 64)	59
j4	**5** (4 – 5)	2	3 (2 – 3)	4 (3 – 5)	2-3	< 10	5	4	**4**	-	3 – 4	-	4
j5	**5**	2	3 (2 – 3)	4 (3 – 5)	2-3	< 10	5	4	**4**	-	3 – 4	-	5
j6	**8** (5 – 8)	6 (5 – 8)	6 (5 – 6)	4 (3 – 5)	2-3	< 10	7 (6–7)	6	**5**	-	3 – 4	-	6
J5	**5** (4 – 5)	3 (2 – 5)	4 (3 – 5)	4 (3 – 5)	9	< 10	4 (4–5)	5	**3**	-	3 – 4	-	4
r3	**38** (35 - 40)	44 (41 – 46)	42 (38 – 46)	43 (41 – 46)	46	36 – 48	44 (42–46)	45	**30**	30	29	32 (28 – 35)	27
R1	**34** (33 – 35)	31 (24 – 38)	28 (26 – 30)	26 (20 – 33)	39	23 – 35	39 (36–41)	25	**13**	13	12	14 (14 – 15)	14
s4	**120** (113 – 123)	120 (110 – 137)	117 (110 – 126)	117 (107 – 124)	127	118 – 130	115 (107–124)	117	**78**	-	81	83 (72 – 95)	81
z2	**11** (10 – 15)	11 (7 – 14)	9 (8 – 10)	8 (5 – 11)	9	< 10	12 (11–12)	9	**13**	-	6	-	9
z4	**10** (5 – 10)	8 (7 – 10)	9 (8 – 10)	10 (8 – 13)	5	< 10	9 (8–9)	11	**16**	-	8	-	8
z5	**6** (6 – 8)	4 (2 – 5)	5	4 (3 – 5)	3	< 10	5 (4–5)	3	**4**	-	3 – 4	-	5
Z1	**9** (6 – 9)	7 (5 – 10)	7 (6 – 8)	8 (8 – 10)	6	< 10	9 (8–10)	8	**6**	-	4	-	6
Z4	**80** (70 – 80)	75 (60 – 86)	72 (67 – 77)	74 (69 – 81)	83	68 – 80	74 (71–80)	71	**45**	48	50	46 (43 – 48)	47
Z5	**105** (99 – 107)	106 (84 – 130)	96 (90 – 101)	82 (76 – 91)	138	96 – 116	104 (102–107)	94	**60**	60	57	57 (52 – 61)	52
st1-st1	**70**	-	-	-	-	-	-	-	**55**	-	-	-	-
st2-st2	**68** (65 – 68)	68 (60 – 74)	65 (62 – 67)	-	60	-	69 (67–72)	66	**55**	-	-	-	-
st3-st3	**75** (75 – 78)	-	-	-	-	-	-	-	**63**	-	-	63 (60 – 65)	-
st1-st3 ♀ / *st1-st5* ♂	**65** (64 – 65)	65 (58 – 72)	64 (61 – 66)	-	65	-	65 (62–68)	66	**110**	-	-	106(101 – 111)	-
st4-st4	**85** (85 – 93)	-	-	-	-	-	-	-	**55**	-	-	-	-
st5-st5	**85**	73 (67 – 74)	82 (80 – 85)	-	96	-	-	79	**48**	-	-	-	-
Lisl	**18**	-	-	-	-	-	-	-			Not applicable		
Lisw	**2**	-	-	-	-	-	-	-					
Vsl	**80**	97 (84 – 108)	99	93 (84 – 102)	100	102 – 108	102 (96–107)	97	**108**	-	76	95 (87 – 109)	-
Vsw *ZV2*	**65**	58 (48 - 62)	61 (56 – 64)	53	55	59 – 63	60 (57–64)	52	**80**	-	117	99 (95 – 108)	-
Vsw *anus*	**63**	52 (43 – 58)	59 (56 – 62)	53 – 55			56 (52–61)	55	**60**	-	-	-	-
JV5	**66** (65 – 75)	-	-	69 (64 – 76)	70	63 – 82	78 (77–78)	-	**23**	22	-	16 (14 – 20)	21
SgeI	-	-	8	-	-	-	-	6	**7**	-	4	-	-
SgeII	**13**	13 (10 – 14)	12 (11 – 13)	-	10	Present	-	13	**10**	-	8	-	-
SgeIII	-	-	13 (11 – 14)	-	-	-	-	13	-	-	-	-	-
StiII	-	-	13 (11 – 14)	-	-	-	-	14	-	-	-	-	-
SgeIV	**23** (21 – 28)	25 (24 – 29)	28 (24 – 32)	28 (25 – 33)	28	22 – 27	22 (21–24)	25	**18**	20	23	-	21
StiIV	**38** (30 – 38)	35 (29 – 41)	34 (33 – 37)	35 (33 – 38)	40	28 – 38	30 (26–33)	35	**28**	30	30	-	29
StIV	**41** (38 – 42)	37 (31 – 43)	41 (40 – 42)	44 (41 – 46)	40	38 – 45	38 (36–42)	43	**33**	33	35	-	35
SttIV	**33** (33 – 45)	-	38 (35 – 40)	33 (30 – 36)	-	34 – 42	38 (36–41)	36	**33**	30 – 35	29	-	-
Scl	**3** (3 – 5)	-	3		5	20	5 (4–5)	-			Not applicable		
Scw	**10** (8 – 11)	-	13 (13 – 14)		-	7	6	-					
Fdl	**27** (27 – 30)	-	26	25	-	-	29 (27–31)	-	**20**	20	-	-	-
No teeth Fd	**7 – 8**	-	7 – 8	7	8 – 9	8	9 – 11	-	-	8	-	7	8
Mdl	**35** (31 – 35)	-	28	29 (28 – 30)	-	-	30 (28–31)	-	**20**	20	-	-	-
No teeth Md	**2**	-	2	2	2	3	2	-	-	1	-	1	1
Shaft				Not applicable					**15**	17	11	-	-

Sources of measurements – For ♀♀: Africa 1 (Benin and Nigeria, no mention of respective number of specimens): Moraes *et al.* (1989); Africa 2 (Burundi 1♀, Kenya 2♀♀, Rwanda 2♀♀) and paratype from Hong-Kong: Moraes *et al.* (2007); Hong-Kong: Swirski & Shechter (1961); Kenya: El-Banhawy & Knapp (2011a); Madagascar (identified as *Paraphytoseius multidentatus* , synonymized by Mathysse & Denmark 1981): Blommers (1976); Mauritius: Ferragut & Baumann (2019). For ♂♂: Madagascar (identified as *Paraphytoseius multidentatus* , synonymized by Mathysse & Denmark 1981): Blommers (1976); Philippines: Schicha & Corpuz-Raros (1985); Taiwan: Ho & Lo (1989); Thailand (identified as *Paraphytoseius multidentatus* , synonymized by Mathysse & Denmark 1981): Ehara & Bhandhufalck (1977). - : not provided.

measurements of specimens collected. Measurements of specimens collected during this study are provided in Table 13.

Specimens examined: 5 ♀♀ in total, all measured. Montvert-les-Hauts – EARL Le Mont Vert farm (aasl 582 m, Long 55°32'19" E, Lat 21°19'42" S), 1 ♀ on *Fragaria* sp., 3 ♀♀ on *E. sonchifolia*, 4/8/2015; Le 19e – Plaine des Caffres, JL Robert farm (aasl 1000 m, Long 55°32'9" E, Lat 21°14'16" S), 1 ♀ on *Phytolacca americana* L., 15/12/2015.

Remarks: measurements of morphological characters (Table 13) of the 5 females fit well with measurements found in the literature, especially with those of specimens collected recently in Mauritius (Kreiter *et al.* 2018a), and particularly for setae *j4*, *J5*, *z2*, *z5* and *r3*. Some setae are slightly shorter in La Réunion specimens compared to specimens from other countries, mainly for the long setae of this species (*j6*, *s4*, *Z1*, *Z4*, and *Z5*). Some other shorter setae of this species, for example *R1* and macrosetae of the leg IV are also shorter in La Réunion specimens. Nevertheless, these findings are questionable given that only five females of *P. persimilis* have been measured compared to measurements of 14 females collected in Mauritius and to large numbers of specimens from other countries.

Tribe Typhlodromipsini Chant & McMurtry

Typhlodromipsini Chant & McMurtry 2005c: 318.

Genus *Typhlodromips* De Leon

Typhlodromipsini Chant & McMurtry 2005c: 318; 2006b: 137; 2007: 55.

Typhlodromips culmulus (van der Merwe)

Amblyseius (*Amblyseius*) *culmulus* van der Merwe 1968: 132; Ueckermann & Loots 1988: 157.
Typhlodromips culmulus, Moraes *et al.* 1986: 139; 2004a: 210; Chant & McMurtry 2005c: 327; Chant & McMurtry 2007: 61.

This species belongs to the *culmulus* species group as the spermatheca has a calyx shallow dish-shaped. This species group contains only 10 species (Chant and McMurtry 2005c).

Typhlodromips culmulus is mentioned from western and southern Africa (Demite *et al.* 2019). It was found recently in Mauritius (Kreiter *et al.* 2018a). Species of this quite large genus are supposed to all belong to the type III (McMurtry and Croft 1997; McMurtry *et al.* 2013), i.e. a polyphagous generalist predator. However, the biology of *T. culmulus* remains totally unknown. This is the first mention of this species from La Réunion Island.

Specimens examined: 105 ♀♀ + 18 ♂♂ + 6 im., 10 ♀♀ + 3 ♂♂ measured. Petite Île – Piton Bloc, Yébo Luguy farm (aasl 973 m, Long 55°34'64" E, Lat 21°18'64" S), 1 ♀ on *I. obscura*, 28/4/2016; 6 ♀♀ + 1 im. on *P. lanceolata*, 2 ♀♀ on *R. raphanistrum*, 1 ♀ on *I. obscura,* 18/10/2016; Le Tampon – Grand Tampon, Janick Bénard farm (aasl 861 m, Long 55°32'90" E, Lat 21°12'80" S), 1 ♀ on *Begonia cucullata*, 7/1/2016; 4 ♀♀ + 2 ♂♂ + 1 im. on *R. raphanistrum,* 1 ♀ on *B. pilosa*, 24/5/2016; 8 ♀♀ + 1 im. on *R. raphanistrum,* 2 ♀♀ on *B. pilosa*, 20/9/2016; Saint-Pierre – Bassin Martin, Armefhor Station (aasl 450 m, Long 55°31'9" E, Lat 21°18'14" S), 18 ♀♀ + 2 ♂♂ + 1 im. on various weeds and 62 ♀♀ + 13 ♂♂ + 2 im. on *C. rotundus*, 3/8/2017; Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 1 ♀ in plot BM, 23/8/2016; 1 ♀ on *A. viridis*, 20/6/2017.

Remarks: measurements of morphological characters of *T. culmulus* female and male specimens from La Réunion (Table 14) are very close from measurements for specimens from neighbouring countries, especially for specimens from Kenya and Mauritius and except for specimens from South Africa which are larger in van der Merwe (1968) but very close for the measurements of type material provided by Moraes *et al.* (2007).

Table 13 Character measurements of adult females of *Phytoseiulus persimilis* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	La Réunion	Mauritius	VCW 1	VCW 2	Types Algeria
	5, this study)	14	29	?	3
Dsl	**349** (295 – 383)	349 (325 – 375)	339 (316 – 369)	322 (314 – 330)	300 – 330
Dsw	**245** (245 – 245)	217 (178 – 245)	227 (196 – 256)	224 (215 – 232)	-
j1	**24** (23 – 25)	25 (20 – 28)	26 (22 – 32)	28 (25 – 32)	25 – 35
j3	**44** (43 – 45)	42 (37 – 50)	42 (31 – 51)	42 (38 – 46)	45 – 55
j4	**45** (40 – 50)	46 (43 – 50)	52 (39 – 72)	50 (48 – 52)	45 – 55
j5	**57** (53 – 60)	65 (55 – 75)	77 (62 – 92)	69 (65 – 74)	65 – 70
j6	**133** (120 – 145)	145 (128 – 155)	150 (114 – 161)	152 (145 – 160)	145 – 160
J5	**5**	5 (4 – 6)	5 (4 – 8)	6 (5 – 6)	5
r3	**24** (23 – 25)	24 (23 – 25)	24 (17 – 29)	23 (21 – 26)	-
R1	**19** (15 – 23)	26 (25 – 31)	29 (22 – 33)	28 (25 – 32)	-
s4	**146** (128 – 165)	165 (150 – 180)	163 (114 – 183)	165 (159 – 172)	145 – 160
S5	**25** (23 – 28)	33 (25 – 40)	29 (20 – 37)	32 (25 – 38)	25 – 35
z2	**15** (13 – 18)	14 (13 – 18)	12 (7 – 16)	12 (10 – 13)	10 – 15
z4	**55** (50 – 60)	57 (53 – 63)	58 (39 – 68)	61 (57 – 65)	45 – 55
z5	**11** (10 – 13)	11 (8 – 13)	10 (7 – 15)	9 (8 – 12)	10 – 15
Z1	**100** (68 – 120)	105 (95 – 115)	107 (94 – 124)	110 (105 – 115)	80 – 90
Z4	**128** (120 – 133)	129 (122 – 139)	135 (119 – 152)	134 (131 – 138)	115 – 125
Z5	**120** (110 – 128)	121 (110 – 128)	125 (113 – 137)	126 (120 – 132)	115 – 125
st1-st1	**50** (48 – 53)	53 (45 – 58)	54 (47 – 61)	-	-
st1-st3	**76** (75 – 78)	71 (60 – 78)	74 (67 – 82)	-	73
st2-st2	**75** (70 – 80)	79 (75 – 88)	80 (69 – 91)	-	-
st2-st3	**34** (33 – 37)	33 (30 – 35)	33 (28 – 37)	-	32
st3-st3	**83** (73 – 93)	90 (80 – 98)	94 (83 – 104)	-	93
st4-st4	**100** (98 – 103)	101 (90 – 115)	99 (82 – 120)	-	-
st5-st5	**69** (50 – 88)	82 (75 – 88)	86 (76 – 82)	-	86
Lisl	**33**	41 (35 – 50)	-	-	-
Lisw	**5**	4 (3 – 5)	-	-	-
Sisl	**20**	18 (13 – 20)	-	-	-
Asl	**75**	76 (50 – 88)	81 (69 – 90)	93 (89 – 98)	-
Asw *anus*	**88**	76 (63 – 88)	77 (63 – 93)		-
JV5	**48** (43 – 50)	46 (43 – 50)	45 (32 – 62)	40 (35 – 44)	-
SgeIV	**61** (53 – 70)	84 (75 – 95)	83 (69 – 94)	84 (80 – 91)	90
StiIV	**47** (43 – 50)	43 (30 – 50)	44 (38 – 48)	45 (40 – 48)	50
StIV	**116** (100 – 133)	134 (125 – 140)	123 (108 – 132)	126 (110 – 135)	125
Scl	**30**	31 (25 – 38)	-	-	-
Scw	**8**	9 (7 – 13)	-	-	-
Fdl	**23** (20 – 25)	26 (25 – 33)	-	-	-
No teeth Fd	**6**	6	-	-	-
Mdl	**23** (20 – 25)	26 (25 – 30)	-	-	-
No teeth Md	**3**	3	-	-	-

Sources of measurements – Mauritius: Kreiter *et al.* (2018a); VCW 1 (Spain 7♀♀, Italy 4♀♀, Syngenta Bioline rearings 11♀♀, Tunisia 7♀♀): Okassa *et al.* (2010); VCW 2 (Sicily, Italy; Valparaiso, Chile; California, USA and Sydney, Australia): Takahashi & Chant (1993); Types Algeria: Athias-Henriot (1957); -: not provided.

Table 14 Character measurements of adult females and males of *Typhlodromips culmulus* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	♀					♂		
	La Réunion	**Kenya**	**Mauritius**	**South Africa**	**Type South Africa**	**La Réunion**	**South Africa 1**	**South Africa 2**
	10, this study	2	1	1	2	3, this study	1	1
Dsl	**358** (343 – 416)	300	313	355	334	**275** (268 – 280)	289	268
Dsw	**233** (198 – 332)	200	200	235	208	**193** (157 – 218)	192	183
j1	**18** (15 – 20)	18	18	21	19	**20** (18 – 23)	23	19
j3	**20** (17 – 23)	18	20	24	22	**21** (20 – 22)	28	25
j4	**10** (8 – 12)	9	10	11	9	**8** (6 – 10)	10	9
j5	**11** (9 – 12)	9	10	11	9	**11** (10 – 14)	10	9
j6	**12** (9 – 15)	10	10	11	13	**9** (8 – 10)	10	9
J2	**14** (13 – 15)	14	13	11	16	**10** (8 – 13)	14	13
J5	**10** (8 – 13)	7	10	11	9	**8**	10	9
r3	**20** (15 – 27)	15	15	19	16	**19** (15 – 23)	19	16
R1	**13** (10 – 15)	12	13	15	13	**13** (10 – 15)	15	11
s4	**29** (25 – 35)	25	28	39	30 – 32	**22** (20 – 23)	33	25
S2	**12** (10 – 13)	12	13	11	13	**9** (9 – 10)	10	9
S4	**11** (9 – 12)	8	10	11	9	**10**	10	9
S5	**10** (8 – 14)	8	8	11	9	**8**	10	9
z2	**13** (11 – 15)	12	13	15	13	**10**	14	13
z4	**11** (10 – 13)	12	13	15	13 – 14	**11** (10 – 12)	14	13
z5	**9** (8 – 10)	7	10	11	9	**9**	10	9
Z1	**15** (13 – 18)	10	13	11	13 – 15	**11** (10 – 11)	10	9
Z4	**38** (33 – 42)	35	33	44	38 – 39	**34** (32 – 35)	40	38
Z5	**73** (69 – 78)	70	75	82	69 – 74	**51** (47 – 55)	62	54
st1-st1	**52** (46 – 58)	-	50	-	-	**47** (46 – 49)	-	-
st2-st2	**63** (60 – 66)	58	60	65	52 – 54	**54** (53 – 55)	-	-
st3-st3	**72** (68 – 77)	-	65	-	-	**60** (58 – 63)	-	-
st1-st3 ♀ / *st1-st5* ♂	**58** (52 – 60)	52	55	65	47	**111** (110 – 113)	-	-
st4-st4	**88** (73 – 100)	-	60	-	-	**48** (43 – 50)	-	-
st5-st5	**68** (64 – 72)	66	68	85	60 – 62	**38** (33 – 42)	-	-
Lisl	**20** (18 – 21)	-	-	-	-			
Lisw	**6** (5 – 8)	-	-	-	-		Not applicable	
Sisl	**10** (8 – 11)	-	-	-	-			
Vsl	**118** (113 – 125)	105	113	115	110	**113** (110 – 118)	115	113
Vsw *ZV2*	**92** (85 – 99)	82	85	90	82 – 85	**156** (140 – 164)	90	151
Vsw *anus*	**86** (80 – 95)	-	63	-	79 – 82	**70** (65 – 75)	-	-
JV5	**39** (35 – 43)	36	33	39	-	**29** (25 – 38)	-	-
SgeI	**34** (30 -37)	-	30	-	30 – 32	**26** (25 – 27)	-	24
SgeII	**30** (28 -34)	28	28	33	25 – 28	**28** (25 – 30)	-	22
SgeIII	**32** (28 -39)	28	30	33	28	**28** (27 – 30)	24	22
StiIII	**28** (26-32)		28	-	22 – 26	- (broken)	24	25
SgeIV	**52** (48 – 57)	46	48	54	47 – 49	**41** (39 – 45)	42	35
StiIV	**39** (28 – 46)	40	30	45	41	**37** (35 – 39)	36	32
StIV	**58** (50 – 65)	55	58	66	63	**50** (50 – 51)	62	54
Scl	**3**	3		3	2			
Scw	**13**	14		12	-		Not applicable	
Fdl	**24** (20 – 28)	-	25	-	22 – 25	**21** (20 – 23)	20	-
No teeth Fd	**2 – 8**	7	5 – 6	8	11 – 12	**6**	8	-
Mdl	**27** (25 – 30)	-	25	-	25 – 26	**19** (18 – 23)	20	-
No teeth Md	**3 – 8**	3	3	3	3	**1**	1	-
Shaft			Not applicable			**28** (23 – 33)	20	19

Sources of measurements – For ♀♀: Kenya: El-Banhawy & Knapp (2011a); Mauritius: Kreiter *et al.* (2018a); South Africa: van der Merwe (1968); type material (the holotype and one paratype) collected in South Africa: Moraes *et al.* (2007a). For ♂♂: South Africa 1 (paratype male): van der Merwe (1968); South Africa 2: Moraes et al. (2007a); - : not provided.

Genus *Scapulaseius* Karg & Oomen-Kalsbeek

Scapulaseius Karg & Oomen-Kalsbeek 1987: 132.
Amblyseius (*Scapulaseius*) Karg & Oomen-Kalsbeek 1987: 132.
newsami group of *Typhlodromus* (*Amblyseius*), Chant 1959: 95.
markwelli species group of *Amblyseius*, Schicha 1987: 25.
japonicus species group of *Amblyseius*, Schicha 1987: 26.
oguroi species group of *Amblyseius*, Wu & Ou 1999: 103.
Scapulaseius, Chant & McMurtry 2005c: 331; 2007: 65.

Scapulaseius reptans (Blommers)

Amblyseius (*Amblyseius*) *reptans* Blommers 1974: 145.
Typhlodromips reptans, Moraes *et al.* 1986: 146; Moraes *et al.* 2004a: 222.
Scapulaseius reptans, Chant & McMurtry 2005c: 335; Chant & McMurtry 2007: 68.

This species belongs to the *ficilocus* species group of the genus *Scapulaseius* as the setae *R1* are inserted on lateral integument of adult female (Chant and McMurtry 2005c). This species group contains 40 species with setae *R1* inserted on the lateral integument of the adult female.

This species is mentioned only from the Indian Ocean area, Madagascar (Blommers 1974), La Réunion (Quilici *et al.* 2000) and recently Mauritius (Kreiter *et al.* 2018a). Species of this genus *Scapulaseius* are supposed to be of type III (McMurtry and Croft 1997; McMurtry *et al.* 2013), i.e. polyphagous generalist predators. However, the biology of *S. reptans* remains unknown. *S. reptans* was already mentioned from La Réunion by Quilici *et al.*(2000). Exact indications of locations were provided in this paper but without any measurements of specimens collected. They are provided for specimens collected during this study and listed in table 15.

Specimens examined: 2 ♀♀ + 1 ♂ in total, all measured. Ravine Langevin – Grand-Galet Waterfall (aasl 850 m, Long 55°21'33" E, Lat 21°17'47" S), 1 ♀ + 1 ♂ on *D. incanum*, 11/12/2016; Petite Île – Piton Bloc, Yébo Luguy farm (aasl 973 m, Long 55°34'64" E, Lat 21°18'64" S), 1 ♀ + 1 im. on *L. camara*, 9/1/2017.

Remarks: measurements of the two female and the male specimens in the table 15 show a great overlap with measurements mentioned in Kreiter *et al.* (2018a) on specimens from Mauritius, except for setae *S2*, *S4* and *S5* which are longer in La Réunion specimens. Setae of specimens from La Réunion are generally longer, except for *j1* and the macroseta of genu I that are nearly the same as for specimens from Mauritius. However, sternogenital shield is longer in Mauritius specimens. Both specimens from La Réunion and Mauritius have globally greater dimensions than type specimens from Madagascar, especially setae.

Ferragut and Baumann (2019) discussed a possible synonymy between *S. reptans* and *S. asiaticus* (Evans) recently. Our specimens of La Réunion Island markedly differ from specimens of *S. asiaticus* collected recently in Vietnam (Kreiter *et al.* in prep.) and we therefore disagree with this possible synonymy with arguments that will be developed in a future paper.

Tribe Amblyseiini Muma

Amblyseiini, Muma, 1961: 68.

Subtribe Amblyseiina Muma

Amblyseiina Muma, 1961: 69.

Genus *Transeius* Chant & McMurtry

Transeius Chant & McMurtry, 2004a: 181.

Table 15 Character measurements of adult females and one adult male of *Scapulaseius reptans* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	♀			♂		
	La Réunion	**Madagascar**	**Mauritius**	**La Réunion**	**Madagascar**	**Mauritius**
	2, this study	5	2	1, this study	3	1
Dsl	**321** (308 – 335)	290	303 – 305	**250**	250	255
Dsw	**210** (198 – 223)	190	185 – 188	**150**	170	175
j1	**23** (20 – 25)	21	23	**15**	16	18
j3	**25** (25 – 25)	15	20 – 23	**20**	20	25
j4	**10**	8	8	**10**	7	10
j5	**9** (8 – 10)	7	8	**8**	8	10
j6	**13** (13 – 13)	10	10	**10**	8	10
J2	**13** (13 – 13)	10	8 – 9	**13**	8	10
J5	**9** (8 – 10)	7	8	**5**	3	6
z2	**21** (20 – 23)	16	18 – 20	**23**	16	13
z4	**25** (25 – 25)	16	23	**20**	16	13
z5	**10**	18	8	**8**	6	10
Z1	**13** (13 – 13)	10	10	**10**	9	13
Z4	**61** (60 – 63)	48	56 – 53	**40**	20	33
Z5	**79** (75 – 83)	70	72 – 75	**58**	35	50
s4	**33**	25	28	**28**	20	25
S2	**24** (23 – 25)	18	22 – 25	**20**	20	10
S4	**20**	15	18 – 23	**20**	15	10
S5	**20** (18 – 23)	14	18 – 20	**18**	13	9
r3	**23** (18 – 28)	15	18	**15**	14	15
R1	**14** (13 – 15)	15	13	**13**	13	13
st1-st1	**50**	-	50	**30**	-	47
st2-st2	**60** (58 – 63)	-	60	**53**	-	53
st1-st3 ♀ / *st1-st5* ♂	**56** (55 – 58)	-	53 – 56	**50**	-	55
st3-st3	**66** (63 – 70)	-	65	**78**	-	105
st4-st4	**79** (73 – 85)	-	65 – 78	**38**	-	40
st5-st5	**61** (60 – 63)	-	60	**38**	-	35
Lisl	**20** (18 – 23)	-	18 – 23			
Lisw	**5**	-	4 – 5		Not applicable	
Sisl	**11** (10 – 13)	-	13 – 11			
Vsl	**115** (115 – 115)	98	98 – 100	**100**	105	113
Vsw *ZV2*	**81** (78 – 85)	78	85 – 87	**133**	-	135
Vsw *anus*	**75** (75 – 75)	-	68 – 70	**75**	-	60
JV5	**34** (33 – 35)	24	28	**18**	17	20
SgeI	**24** (23 – 25)	-	23	**25**	-	25
SgeII	**15**	-	13 – 15	**15**	-	20
SgeIII	**19** (18 – 20)	-	18	**18**	-	25
StiIII	**18** (15 – 20)	-	18	-		20
SgeIV	**31** (30 – 33)	27	28	**25**	19	35
StiIV	**28** (28 – 28)	20	23 – 25	**23**	15	20
StIV	**59** (55 – 63)	50	50 – 53	**45**	45	48
Scl	**30**	45	30 – 35		Not applicable	
Scw	**10**	2	2			
Fdl	**28** (25 – 30)	26	25	**20**	-	20
No teeth Fd	**10**	8	9	**8**	8	8
Mdl	**23** (20 – 25)	26	25	**23**	-	23
No teeth Md	**3**	3	3	**1**	1	1
Shaft	Not applicable			**15**	15	17

Sources of measurements – For ♀♀: Madagascar: Blommers (1974); Mauritius: Kreiter *et al.* (2018a). For ♂♂: Madagascar: Blommers (1974); Mauritius: Kreiter *et al.* (2018a). - : not provided.

Transeius maelliae Kreiter n. sp.

Zoobank: C6EA34F5-9601-4208-8201-B14CE6C6FC5D

Diagnosis — *Transeius maelliae* Kreiter **n. sp.** belongs to the subfamily Amblyseiinae (absence of dorsolateral setae *z3* and *s6* and caudoventral seta *JV3*), to the tribe Amblyseiini (setae *j3*, *s4*, *Z4* and *Z5* longer than other setae, ratio *s4*/*Z1* > 3.1, many teeth on the fixed cheliceral digit and macrosetae on several legs in addition of the three on leg IV), to the subtribe Amblyseiina (sternal shield as long as wide, ventrianal shield longer than wide, seta *J2* present, genital shield almost as wide as ventrianal shield, ventral shields generally smooth, macrosetae on all legs, setae *j5*, *J2*, *S2*, *S4*, *S5* and *Z1* present), to the genus *Transeius* (ratio *s4*/*S2* < 2.7, Setae *S5* present, spermathecal with atrium not bifurcate) (Chant and McMurtry 2007). Seta *z4* is not as long as 2/3 the distance between its base and that of seta *s4* that allows to classify this new species in the species group *bellottii* (Chant and McMurtry 2004a). The bell-shaped spermatheca keys to the species subgroup *bellottii*.

Transeius maelliae Kreiter **n. sp.** is quite similar to the other new species described further, *T. mickaeli* Kreiter **n. sp.** with which it was at first confused early on during the identification process. *T. maelliae* **n. sp.** is different from *T. mickaeli* **n. sp.** by: having only five solenostomes instead of seven, a longer seta *z4*, almost double, the shape of the spermatheca also bell-shaped but with an undistinct atrium, longer setae *JV5*, less teeth on both digits of chelicerae and very slightly reticulated ventral shields (see table 27).

In the species subgroup *bellottii*, the species closest to *T. maelliae* **n. sp.** is *Transeius jujae* El-Banhawy and Knapp. *T. maelliae* **n. sp.** resembles to *T. jujae*, having similar lengths for setae *j3*, *s4*, *Z4*, *Z5*, and *JV5*, and the dimensions of the spermatheca. The new species can be distinguished however by the longer length of setae *z2*, above all by the length of setae *z4* which is 2.5 as long as that of *T. jujae*, and by the shape of the spermatheca with an undifferentiated atrium and walls of calyx slightly converging apically in the new species opposed to a distinct atrium and walls of calyx strictly parallel in *T. jujae*. In addition, a macroseta is existing in the genu of leg I of *T. maelliae* **n. sp.** and lacking in specimens of *T. jujae,* the ventrianal shield is wider and the dorsal shied is totally smooth in that species.

Description of the adult female

n = 4 (Figs. 2a – d)

Dorsum — (Fig. 2a). Dorsal shield fused with peritremal shield in the level of *j1* position, smooth except some slight reticulation near the anterolateral margins of the dorsal shield, 393 (368 – 418) long and 221 (203 – 243) wide, with five solenostomes (*gd1*, *gd5*, *gd6*, *gd8*, and *gd9*), 13 pairs of poroids or lyrifissures, 17 pairs of dorsal setae and two pairs of sub-lateral setae off the dorsal shield: *j1* 30 (25 – 35), *j3* 39 (38 – 40), *j4* 8, *j5* 8, *j6* 11 (10 – 13), *J2* 9 (8 – 10), *J5* 10, *z2* 16 (14 – 18), *z4* 30 (28 – 33), *z5* 7 (6 – 8), *Z1* 11 (10 – 11), *Z4* 53 (50 – 55), *Z5* 75 (70 – 81), *s4* 47 (43 – 51), *S2* 21 (20 – 21), *S4* 15 (13 – 15), *S5* 13 (10 – 15), *r3* 18 (18 – 20), *R1* 19 (18 – 20). All setae smooth except *Z5* which is very slightly serrated (with few barbs) in only two of the four specimens collected.

Peritreme — (Fig. 2a). Reaching the level of *j1*.

Venter — (Fig. 2b). All ventral shields smooth. Sternal shield with three pairs of setae and two pairs of lyrifissures; one pair of sternal setae on a small metasternal shield with one poroid; posterior margin of the sternal shield straight to slightly convex. Distances between *st1*-*st1* 66 (65 – 70), *st2*-*st2* 78, *st3*-*st3* 84 (80 – 85), *st1*-*st3* 73 (70-75), *st4*-*st4* 84 (80-95). Genital shield length 122 (113 – 128), width at the level of *st5* 83 (78 – 86), width at the level of the posterior corners 88 (83 – 93), distance *st5*-*st5* 75 (73 – 78). Two pairs of metapodal shields 22 (20 – 23) long and 5 (4 – 6) wide for the larger and 11 (10 – 11) long the slender shield. Ventrianal shield with three pairs of preanal setae (*JV1*, *JV2* and *ZV2*), two small oblong pre-anal solenostomes 37-40 apart. Cribrum spicules on three lines. Membrane surrounding ventrianal shield with four pairs of setae (*ZV1*, *ZV3*, *JV4* and *JV5*), and seven pairs of round to oblong poroids around

genital/ventrianal shields; ventrianal shield 133 (125 – 145) long, 99 (93 – 103) wide at level of anterior corners (*ZV2*), and 87 (83 – 90) wide at level of anus. *JV5* smooth 51 (48 – 53) long.

Chelicera — Chelicerae visible but dorsoventrally oriented; therefore, they are not drawn. Fixed digit 36 (35 – 38) long with no discernible tooth on the four females; movable digit 39 (38 – 40) long with putatively 2 teeth.

Spermatheca — (Fig. 2c). Spermatheca pocular (Denmark *et al.* 1999), with a moderately elongate calyx 18 (13 – 20) long and 8 (6 – 9) wide, without neck and an undifferentiated atrium. The walls of calyx are slightly converging apically in the four specimens examined. Long ductus major membranous visible and short ductus minor not well discerned.

Legs — (Fig. 2d). Macrosetae on all legs, all pointed except on leg IV slightly knobbed, one on genu of leg I, II and III, one on tibia III and three on leg IV, with one on each of genu, tibia and basitarsus: *SgeI* 27 (25 – 28), *SgeII* 32 (31 – 33), *SgeIII* 33 (31 – 35), *Sti III* 23 (20 – 25), *SgeIV* 60 (58 – 63), *StiIV* 48 (43 – 50), *StIV* 83 (80 – 87). Genu II and III with seven setae each, chaetotactic formula of genu II: 1-2/0, 2/0-1; genu III: 1-2/0, 2/0-1.

Male — Unknown.

Specimens examined — 4 ♀♀ + 2 im. in total, 4 ♀♀ measured and 4 ♀♀ + 2 im. as type material (see below Type material for the deposit). Forêt de Bélouve – Trou de fer (aasl 1300 m, Long 55°33'36" E, Lat 21°2'24" S), 2 ♀♀ + 1 im. on *Erica arborescens* (Willd.), 28/1/2017; Forêt de Bélouve – Gîte (aasl 1500 m, Long 55°33'36" E, Lat 21°6'0" S), 1 ♀ + 1 im. on *Weinmannia macrostachya* DC., 28/1/2017; Forêt de Sans Souci – Ilet Alcide, (aasl 1452 m, Long 55°22'07" E, Lat 21°01'17" S), 1 ♀ on *Eriobotrya japonica* (Thumb.) Lindl., 18/11/2018.

Type material — The holotype female, three paratype females and two paratype immatures deposited in Montpellier SupAgro – INRA Acarology collection, Montpellier.

Etymology — The name "*maelliae*" refers to the stepdaughter of Serge Kreiter, Maëllia Gaultier, to whom the new species is dedicated.

Remarks — Table 16 shows comparison of *T. maelliae* **n. sp.** and the closest species in the whole genus *Transeius*, *T. jujae* (see diagnosis above) and the next new species described below.

All specimens of *T. maelliae* **n. sp.** were found between 1300 and 1500 m aasl and in humid tropical forests, along with two other species, the next new species described below and *Amblyseius neoankaratrae* Ueckermann and Loots.

Transeius mickaeli Kreiter n. sp.

Zoobank: 2C86EAF9-4708-4674-88BA-B76BDD38B95F

Diagnosis — *Transeius mickaeli* Kreiter **n. sp.** belongs also to the subfamily Amblyseiinae (see above description of *T. maelliae* **n. sp.**), to the tribe Amblyseiini (see above), to the subtribe Amblyseiina (see above), to the genus *Transeius* (see above) (Chant and McMurtry 2007) and to the species group *bellottii* and to the species subgroup *bellottii* (Chant and McMurtry 2004a).

Transeius mickaeli **n. sp.** is different from *T. maelliae* **n. sp.** described above, by several characters indicated above in the description of *T. maelliae* (see diagnosis of *T. maelliae*).

In this subgroup *bellottii*, the closest species of *T. mickaeli* **n. sp.** is *Transeius quichua* (McMurtry and Moraes). *Transeius mickaeli* **n. sp.** differs however from *T. quichua* in having 7 solenostomes instead of 6, longer setae *j1*, *s4*, *S2*, *Z4*, and *StIV* and shorter setae *Z5*, peritreme reaching *j1* and not between *j1* and *j3*, reticulations of the dorsal shield, slight reticulations of the sternal and moreover of the ventrianal shields in the female and male, shape of the spermatheca which is saccular and bell-shaped in the new species and more cup shaped, pocular and open (Denmark and Evans 2011) in *T. quichua* and the insertion of *gv3* further to *JV2* insertion in the new species (*gv3* are very close to setae *JV2* positions in *T. quichua*).

Description of the adult female

n = 6 (Figs. 3 a – d)

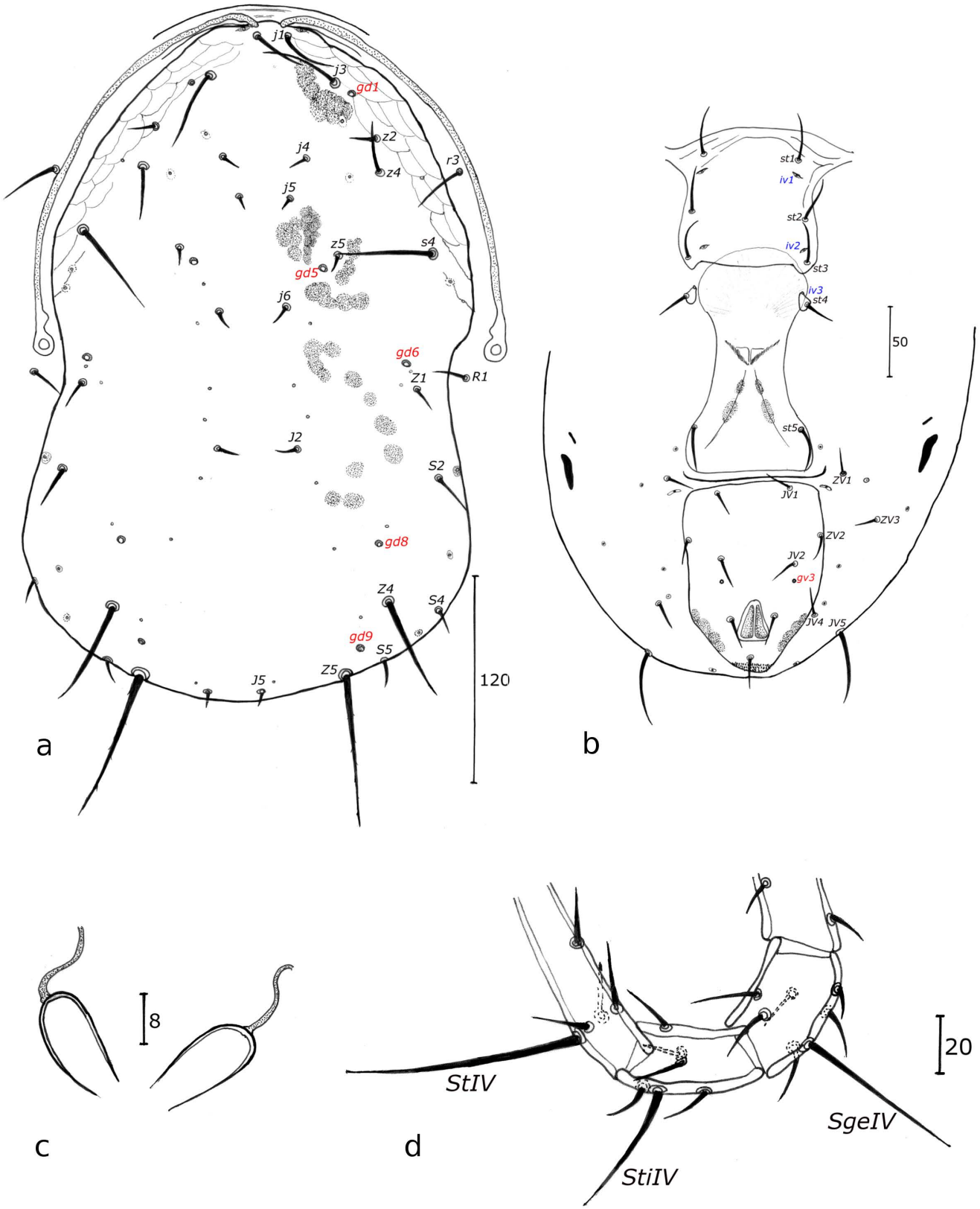

Figure 2 Female of *Transeius maelliae* Kreiter **n. sp.**: a – Dorsal shield and peritreme; b – Ventral shields; c –Iinsemination apparatus; d – Genu, tibia and basitarsus of the leg IV.

Table 16 Character measurements of adult female specimens of *Transeius maelliae* Kreiter **n. sp.** and of female and male specimens of *T. mickaeli* Kreiter *n. sp.* collected in this study with those of *T. jujae* and *T. quichua*, respectively (number of specimens measured between brackets).

Characters	*Transeius maelliae* 4♀♀, this study	*Transeius jujae* 1♀	*Transeius mickaeli* 6♀♀this study	*Transeius quichua* 5♀♀	*Transeius mickaeli* 2♂♂ this study	*Transeius quichua* 1♂
Dsl	**402** (378 - 418)	350	**403** (333 - 512)	410 (403 – 420)	**300 – 360**	307
Dsw	**225** (203 - 243)	195	**221** (200 - 295)	225 (217 – 240)	**195 – 238**	199
Per. ext., No gd	**j1, 5:** ***gd2*** and ***4*** missing	j1, 6: *gd5* missing	**j1, 7, all** ***gd*** present	j1-j3, 6: *gd 4* missing	**j1, 7**	*z2-j3* , gd5 missing
j1	**30** (25 - 35)	24	**29** (25 - 35)	25 (23 – 26)	**23**	18
j3	**39** (38 - 40)	39	**34** (33 - 36)	35 (33 – 36)	**23 – 28**	31
j4	**8**	12	**11** (10 - 13)	9 (8 – 10)	**9 – 10**	11
j5	**8**	7	**10** (8 - 11)	7 (7 – 8)	**9 – 10**	9
j6	**11** (10 - 13)	9	**11** (10 - 13)	12 (11 – 13)	**10 – 12**	13
J2	**9** (8 - 10)	9	**10** (10 - 10)	12 (12 – 13)	**15**	14
J5	**10** (10 - 10)	9	**8** (8 - 10)	7 (7 – 8)	**8**	8
r3	**18** (18 - 20)	20	**19** (18 - 20)	16 (14 – 17)	**18**	18
R1	**19** (18 - 20)	20	**19** (18 - 23)	16 (14 – 17)	**18**	17
s4	**47** (43 - 51)	50	**41** (38 - 45)	36 (34 – 36)	**28**	25
S2	**20** (20 - 21)	23	**24** (23 - 28)	19 (18 – 21)	**33**	18
S4	**14** (13 - 15)	12	**16** (10 - 23)	17 (15 – 17)	**18**	17
S5	**13** (10 - 15)	12	**13** (10 - 16)	17 (17 – 18)	**15**	16
z2	**16** (14 - 18)	21	**16** (13 - 19)	13 (12 – 14)	**15**	18
z4	**30** (28 - 33)	12	**16** (15 - 18)	18 (17 – 19)	**15**	19
z5	**7** (6 - 8)	12	**10** (10 - 10)	7	**9 – 10**	8
Z1	**10** (10 - 11)	12	**13** (13 - 15)	12 (12 – 13)	**15**	14
Z4	**53** (50 - 55)	48	**47** (38 - 59)	38 (36 – 41)	**35 – 40**	28
Z5	**75** (70 - 81)	74	**63** (58 - 68)	71 (57 – 77)	**55**	43
st1-st1	**67** (65 - 70)	-	**62** (55 - 66)	-	**50 – 54**	-
st2-st2	**78** (78 - 78)	74	**75** (73 - 78)	75 (73 – 77)	**58 – 65**	59
st3-st3	**83** (80 - 85)	-	**78** (75 - 80)	-	**58 – 63**	-
st1-st3 ♀ / *st1-st5* ♂	**73** (70 - 75)	70	**73** (68 - 78)	67 (65 – 68)	**118 – 128**	125
st4-st4	**85** (80 - 95)	-	**80** (73 - 88)	-	**45 – 50**	-
Gensl	**122** (113 – 128)	-	**135** (130 – 143)			
Gensw *st5*	**83** (78 – 90)	-	**82** (78 – 85)		Not applicable	
Gensw post. corn.	**88** (83 – 93)	-	**87** (83 – 93)			
st5-st5	**75** (73 - 78)	78	**77** (68 - 90)	74 (72 – 77)	**35 – 43**	-
Lisl	**22** (20 - 23)	-	**24** (18 - 28)			
Lisw	**5** (5 - 6)	-	**5** (4 - 8)		Not applicable	
Sisl	**11** (10 - 11)	-	**11** (8 - 13)			
Vsl	**136** (125 - 145)	110	**121** (105 - 143)	124 (114 – 137)	**105 – 115**	122
Vsw *ZV2*	**99** (93 - 103)	97	**100** (93 - 105)	96 (92 – 98)	**135 – 165**	160
Vsw *anus*	**88** (88 - 90)	-	**81** (65 - 93)	86 (84 – 89)	**63 – 75**	-
JV5	**51** (48 - 53)	-	**32** (23 - 40)	-	**15 – 20**	-
SgeI	**27** (25 - 28)	-	**23** (19 - 25)	22	**20**	22
SgeII	**32** (31 - 33)	35	**23** (20 - 28)	22	**15 – 18**	18
SgeIII	**33** (31 - 35)	35	**24** (23 - 25)	25	**20**	14
StiIII	**23** (20 – 25)	-	**21** (20 – 23)	-	**20**	-
SgeIV	**60** (58 - 63)	52	**38** (35 - 48)	37 34 – 38)	**23**	23
StiIV	**47** (43 - 50)	48	**34** (30 - 38)	30 (28 – 32)	**20 – 25**	20
StIV	**82** (80 - 87)	76	**77** (70 - 82)	50 (45 – 53)	**55 – 69**	34
Scl	**18** (13 - 20)	16	**15** (14 - 15)	11 (10 – 12)	Not applicable	
Scw	**8** (6 - 9)	5	**8** (5 - 10)	-		
Fdl, No teeth	**36** (35 - 38), **3?**	4	**34** (28 - 38), **7**	29 (28 – 30), 6 – 7	**23 – 25, 4?**	-
Mdl, No teeth	**39** (38 - 40), **1???**	3	**40** (30 - 45), **2**	32 (30 – 33), 2	**15 – 18, 1?**	-
Shaft	Not applicable				**20 – 25**	-

Sources of measurements – For *Transeius jujae* : El-Banhawy & Knapp (2011a); For T*ranseius quichua* : McMurtry & Moraes (1989); - : not provided.

Dorsum — (Fig. 3a). Dorsal shield fused with peritremal shield close to *j1* position, 403 (333 – 512) long and 221 (200 – 295) wide, slightly reticulated anterolateraly, with seven solenostomes (*gd1*, *gd2*, *gd4*, *gd5*, *gd6*, *gd8*, *gd9*), 11 pairs of poroids, 17 pairs of dorsal setae and two pairs of sub-lateral setae: *j1* 29 (25 – 35), *j3* 34 (33 – 36), *j4* 11 (10 – 13), *j5* 10 (8 – 11), *j6* 11 (10 – 13), *J2* 10, *J5* 8 (8 – 10), *z2* 16 (13 – 19), *z4* 16 (15 – 18), *z5* 10, *Z1* 13 (13 – 15), *Z4* 47 (38 – 59), *Z5* 63 (58 – 68), *s4* 41 (38 – 45), *S2* 24 (23 – 28), *S4* 16 (10 – 23), *S5* 13 (10 – 16), *r3* 19 (18 – 20), *R1* 19 (18 – 23). All setae smooth except Z5 that is often smooth and sometimes very slightly barbed.

Peritreme — (Fig. 3a). Extending to the level *j1*.

Venter — (Fig. 3b). All shields very slightly reticulated. Sternal shield with three pairs of setae and two pairs of lyrifissures; one pair of sternal setae on elongate metasternal shields with a pair of pores; posterior margin straight to very slightly convex. Distances between *st1-st1* 62 (55 – 66), *st2-st2* 75 (73 – 78), *st3-st3* 78 (75 – 80), *st1-st3* 73 (68 – 78), *st4-st4* 80 (73 – 88). Genital shield length 135 (130 – 143), width at the level of *st5* 82 (78 – 85), width at the level of the posterior corners 87 (83 – 93), distance *st5-st5* 77 (68 – 90). Two pairs of metapodal shields 24 (18 – 28) long and 5 (4 – 8) wide for the larger and 11 (8 – 13) long for the slender shield. Ventrianal shield with three pairs of preanal setae (*JV1*, *JV2*, and *ZV2*), small rounded oblong *gv3* 43-45 apart, almost directly posterior in straight line to setae JV2. Ratio JV2-JV2 / gv3-gv3 between 1.1 and 1.3. Membrane surrounding ventrianal shield with four pairs of setae (*ZV1*, *ZV3*, *JV4* and *JV5*), and six pairs of round to oblong poroids; ventrianal shield 121 (105 – 143) long, 100 (93 – 105) wide at level of anterior corners (*ZV2*), and 81 (65 – 93) wide at level of *anus*. *JV5* smooth, 32 (23 – 40) long.

Chelicera — Chelicerae are visible but not by the side with digits open. Consequently, they are not drawn. Fixed digit 34 (28 – 38) long with 7 teeth; and movable digit 40 (30 – 45) long with 2 teeth.

Spermatheca — (Fig. 3c). Spermatheca pocular (Denmark *et al.* 1999), with an unelongate calyx 15 (14 – 15) long and 8 (5 – 10) wide, a differentiated atrium at the basis of the calyx. Visible short ductus minor and a long ductus major.

Legs — (Fig. 3d). Macrosetae on all legs, all pointed, one on genua of Legs I, II and III, and three on genu, tibia and basitarsus of leg IV: *SgeI* 23 (19 – 25), *SgeII* 23 (20 – 28), *SgeIII* 25 (23 – 28), *StiIII* 21 (20 – 23), *SgeIV* 38 (35 – 48), *StiIV* 34 (30 – 38), *StIV* 77 (70 – 82). Genu II and III with 7 setae each, chaetotactic formula of genu II: 2-2/0, 2/0-1; genu III: 1-2/1, 2/0-1.

Description of the adult male

n = 2 (Figs 4 a – c)

Dorsum — (Fig. 4a). Dorsal shield fused with peritremal shield close to *j1* position, 300 – 360 long and 195 – 238 wide, with 7 solenostomes like in the female but *gd5* having migrate just behind *s4*. The dorsal shield bears 17 pairs of dorsal setae and 2 pairs of sub-lateral setae on the dorsal shield: *j1* 23, *j3* 23 – 28, *j4* 9 – 10, *j5* 9 – 10, *j6* 10 – 12, *J2* 15, *J5* 8, *z2* 15, *z4* 15, *z5* 9 – 10, *Z1* 15, *Z4* 35 – 40, *Z5* 55, *s4* 28, *S2* 33, *S4* 18, S5 *15*, *r3* 18, *R1* 18. All setae smooth except *Z5* which is very slightly serrated with only few barbs.

Peritreme — (Fig. 4a). Extending to the level of *j1*. Peritremal shield fused with dorsal shield.

Venter — (Fig. 4b). All ventral shields very lightly reticulated. Distances between *st1* – *st1* 50 – 54, *st2* – *st2* 58 – 65, *st3* - *st3* 58 – 63, *st1* – *st5* 118 – 128, *st4* - *st4* 45 – 50, *st5* – *st5* 35 – 43. Ventrianal shield with three pairs of pre-anal setae, *JV1*, *JV2*, and *ZV2*, five pairs of pre-anal poroids and a pair of small oblong solenostomes 30 – 33 apart, almost directly posterior in straight line to setae JV2. Membrane surrounding ventrianal shield with one pair of setae *JV5* smooth; ventrianal shield 105 – 115 long, 135 – 165 wide at anterior corners and 63 – 75 wide at level of *anus*. *JV5* 15 – 20 long, smooth. A pair of lyrifissures near *JV5*.

Chelicera — Fixed digit 23 – 25 long, with 4 (?) teeth and movable digit 15 – 18 long with 1 (?) tooth. Spermatodactyl L-shaped, shaft (Fig. 4c) 20 – 25.

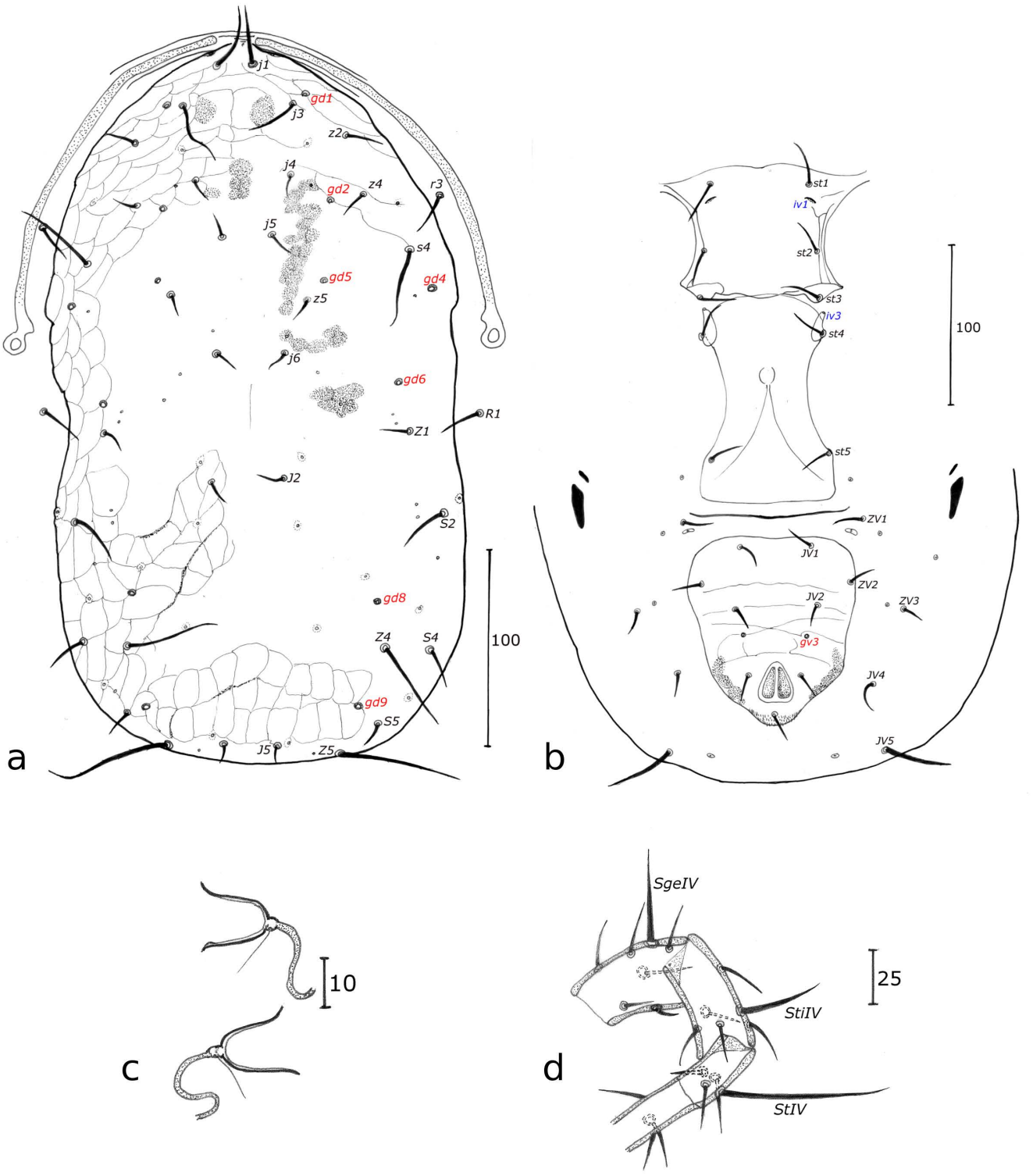

Figure 3 Female of *Transeius mickaeli* Kreiter **n. sp.**: a – Dorsal shield and peritreme; b – Ventral shields; c – Insemination apparatus; d – Genu, tibia and basitarsus of the leg IV.

Legs — Legs and macrosetae like in females with shorter dimensions. Macrosetae on all legs like in females: *SgeI* 20, *SgeII* 15 – 18, *SgeIII* 20, *StiIII* 20, *SgeIV* 23, *StiIV* 20 – 25, and

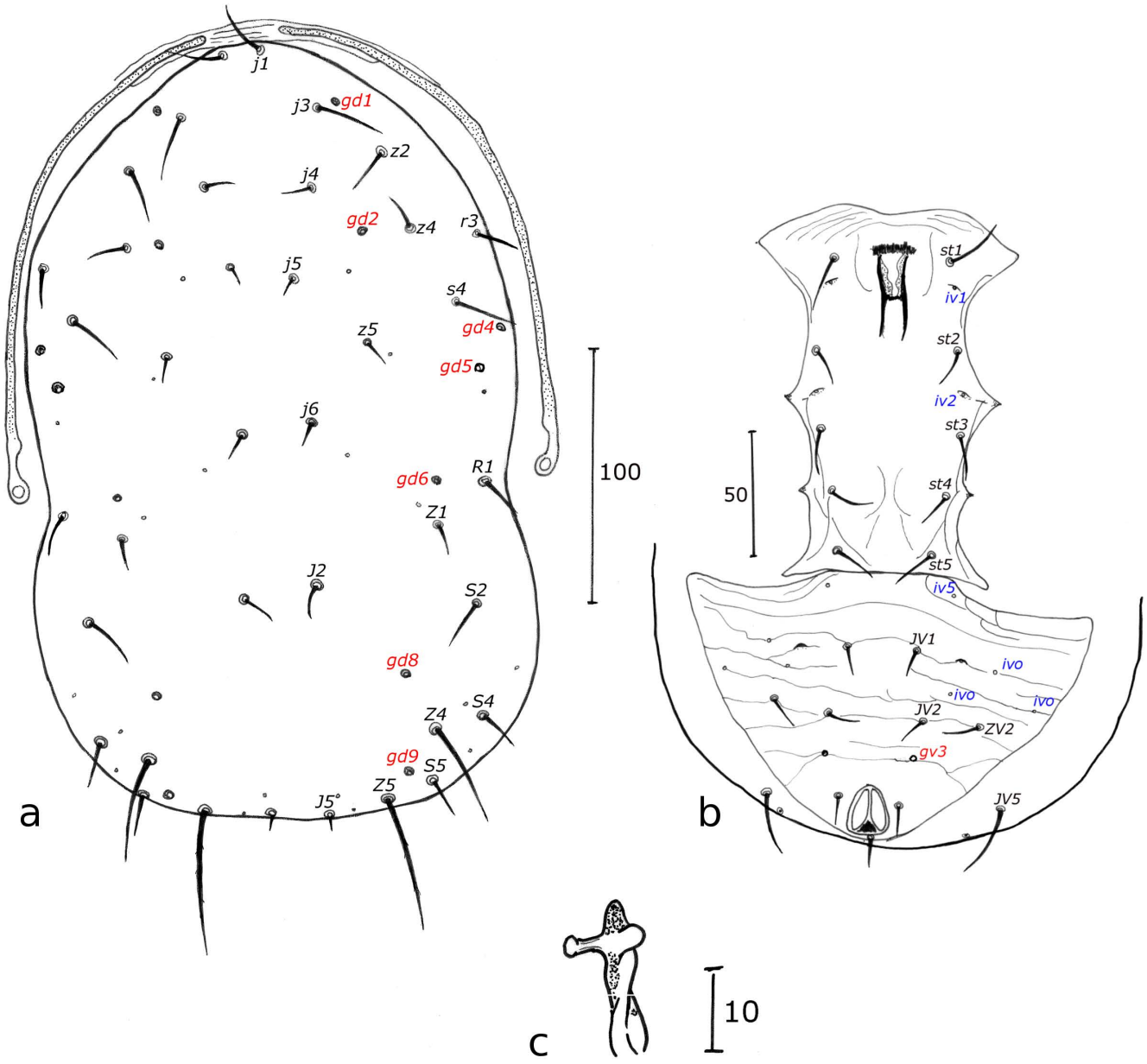

Figure 4 Male of *Transeius mickaeli* Kreiter **n. sp.**: a – Dorsal shield and peritreme; b – Ventral shields; c – Spermatodactyl.

StIV 55 – 69. Chaetotactic formula of genu II and III similar to females.

Specimens examined — Six ♀♀ + 2 ♂♂ + 3 im. in total, 6 ♀♀ + 2 ♂♂ measured, and 6 ♀♀ + 2 ♂♂ + 3 im. as type material (see below Type material for the deposit). Forêt de Bélouve – Gîte (aasl 1500 m, Long 55°33'36" E, Lat 21°6' S), 1 ♂ + 1 im. on *Cyathea borbonica* Desv., 28/1/2017; Forêt de Bélouve – Trou de fer (aasl 1300 m, Long 55°33'36" E, Lat 21°2'24" S), 4 ♀♀ + 1 ♂ + 1 im. on *E. arborescens*, 2 ♀♀ + 1 im. on *Acacia heterophylla* (Lam.) Willd., 28/1/2017.

Type material — The holotype female, five paratype females, 2 paratype males and 4 paratype immatures in 4 slides deposited in CBGP, in Montpellier SupAgro Acarology collection, France.

Etymology — The name "*mickaeli*" refers to the stepson of Serge Kreiter, Mickaël Gaultier,

to whom this new species is dedicated.

Remarks — Table 16 shows comparison of *T. mickaeli* **n. sp.** and the closest species, *T. maelliae* **n. sp.** and *T. quichua* (McMurtry and Moraes).

All specimens of *T. mickaeli* **n. sp.** were found between 1300 and 1500 m aasl and in humid tropical forests, sometimes in mixed populations with *T. maelliae* **n. sp.** and/or with *A. neoankaratrae*.

Transeius soniae Zannou, Moraes & Oliveira

Transeius soniae Zannou, Moraes & Oliveira in Zannou *et al.* 2007: 38; El-Banhawy & Knapp 2011: 22.

Just like the two previous new species, *T. soniae* belongs to the *bellottii* species group. It belongs to the *namurensis* species subgroup as the spermatheca has the calyx swollen basally, then narrowing and flaring distally. This species subgroup contains only six species (Chant and McMurtry 2004a, Zannou *et al.* 2007, Tixier *et al.* 2016).

This species was described and mentioned only from Kenya. Although species of *Transeius* are considered as type III-b (generalist predators living on glabrous leaves) (McMurtry *et al.* 2013) phytoseiids based on the only studied species, *Transeius montdorensis* (Schicha) (McMurtry and Croft 1997, McMurtry *et al.* 2013), the biology of *T. soniae* remains totally unknown, just like many other species of *Transeius*, including the two new species above described.

This is the first mention of this species in another country than Kenya and the first mention for La Réunion Island.

Specimens examined: 3 ♀♀ in total, all measured. Le Tampon – Grand Tampon (aasl 1100 m, Long 55°34'12" E, Lat 21°16'48" S), 3 ♀♀ on *S. mauritianum*, 18/1/2017.

Remarks: measurements of specimens of La Réunion (Table 17) fit well with those already published in the literature, especially with those of the original description of Zannou *et al.*(2007). Some setae such as *j4* and *j5* are longer in La Réunion specimens than those in Kenya specimens. Setae *s4*, *S2*, and *Z4* (between 14 and > to 22 %) and in a lesser extent *Z1* are however shorter than those collected in Kenya (Zannou *et al.* 2007; El-Banhawy and Knapp 2011).

Table 17 Character measurements of adult females of *Transeius soniae* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	Réunion	Kenya 1	Kenya 2	Characters	Réunion	Kenya 1	Kenya 2	Characters	Réunion	Kenya 1	Kenya 2
	3, this study	7	3		3, this study	7	3		3, this study	7	3
Dsl	**340** (340 – 340)	346 (336 – 358)	330	*z2*	**24** (23 – 25)	28 (26 – 30)	25	Vsl	**120** (113 – 128)	129 (120 – 138)	-
Dsw	**193** (190 – 200)	202 (194 – 208)	210	*z4*	**35** (33 – 38)	33 (30 – 37)	35	Vsw *ZV2*	**84** (83 – 85)	89 (83 – 96)	-
j1	**26** (25 – 28)	29 (27 – 30)	28	*z5*	**11** (10 – 13)	9 (8 – 10)	9	Vsw *anus*	**80** (78 – 83)	83 (80 – 88)	-
j3	**46** (45 – 48)	55 (51 – 59)	45	*Z1*	**14** (13 – 15)	11 (11 – 13)	12	*JV5*	**53** (50 – 55)	-	60
j4	**21** (18 – 23)	14 (13 – 16)	12	*Z4*	**66** (65 – 68)	85 (82 – 90)	80	*SgeI*	**26** (25 – 28)	26 (22 – 29)	-
j5	**16** (15 – 18)	12 (10 – 13)	12	*Z5*	**75**	99 (96 – 104)	90	*SgeII*	**26** (25 – 28)	28 (24 – 32)	26
j6	**13**	10 (8 – 13)	10	*r3*	**33**	34 (32 – 37)	25	*SgeIII*	**25**	24 (22 – 26)	26
J2	**13**	9 (8 – 10)	9	*R1*	**21** (18 – 23)	19 (19 – 21)	20	*StiIII*	**23**	23 (21 – 24)	-
J5	**9** (8 – 10)	9 (8 – 10)	8	*st1-st1*	**62** (58 – 65)	-	-	*SgeIV*	**45**	51 (50 – 54)	46
s4	**78** (75 – 80)	90 (82 – 104)	80	*st2-st2*	**74** (73 – 75)	71 (70 – 74)	70	*StiIV*	**38** (35 – 40)	38 (35 – 42)	65
S2	**50** (45 – 53)	63 (59 – 66)	55	*st3-st3*	**83** (80 – 85)	-	-	*StIV*	**69** (63 – 75)	69 (66 – 70)	72
S4	**13**	12 (11 – 13)	12	*st1-st3*	**67** (65 – 68)	67 (64 – 70)	62	Scl	**19** (18 – 20)	19 (16 – 21)	20
S5	**13**	10 (8 – 13)	10	*st4-st4*	**80** (78 – 83)	-	-	Scw	**6** (5 – 8)	-	6 – 8
				st5-st5	**76** (75 – 78)	71 (67 – 77)	72	Fdl	**36** (33 – 38)	30	-
				Lisl	**26** (25 – 28)	-	-	No teeth Fd	**11**	10	10 – 11
				Lisw	**3**	-	-	Mdl	**34** (33 – 35)	34 (34 – 35)	-
				Sisl	**13** (10 – 15)	-	-	No teeth Md	**3**	3	5

Sources of measurements – Kenya 1, original description: Zannou *et al.* (2007); Kenya 2: El-Banhawy & Knapp (2011a); -: not provided.

Genus *Amblyseius* Berlese

Amblyseius Berlese, 1914: 143.

Amblyseius djenaeli Kreiter n. sp.

Zoobank: F3A10C4E-9A70-457F-A76D-939A73A17CFF

Diagnosis — *Amblyseius djenaeli* Kreiter **n. sp.** belongs to the subfamily Amblyseiinae (absence of dorsolateral setae *z3* and *s6* and the caudoventral setae *JV3*), to the tribe Amblyseiini (setae *j3*, *s4*, *Z4* and *Z5* longer than other setae, ratio *s4* / *Z1* > 3.1, many teeth on the fixed cheliceral digits and macrosetae on legs I, II and/or III[?] in addition of macrosetae on leg IV), to the subtribe Amblyseiina (sternal shield as long as wide, ventrianal shield longer than wide, seta *J2* present, genital shield almost as wide as ventrianal shield, ventral shields generally smooth, macrosetae on all legs, setae *j5*, *J2*, *S2*, *S4*, *S5* and *Z1* present), to the genus *Amblyseius* (ratio *s4* / *S2* > 3.0, chelicerae of normal size with fixed digit of the same size as movable digit, seta *JV2* present, without incision in lateral margin of dorsal shield at the level of seta *s4*, ventrianal shield not reduced to a simple anal shield, Ge III and Ti III each generally with a macroseta) (Chant and McMurtry 2007).

Setae *J2* and *Z1* are present, dorsocentral setae and setae *z2*, *z4*, *Z1*, *S2*, *S4*, and *S5* are minute, setae *s4*, *Z4* and *Z5* are prominent, elongate and whip-like, female ventrianal shield usually pentagonal, as wide at level of anus than at level of setae *ZV2* or wider at this later level, which allows to classify this new species in the species group *obtusus*(Chant and McMurtry 2004a).

Like *A. tamatavensis*, *A. djenaeli* **n. sp.** belongs to the species subgroup *aerialis* with spermatheca tubular. This subgroup contains 46 species (Chant and McMurtry 2004a). Many of those species are very different from the new species (Table 18).

The type material of the more similar species, *A. solani*, was requested in Cuba for comparison with *A. djenaeli* **n. sp.** without any success.

Description of the adult female

n = 5 (Figs. 5 a – e)

Dorsum — (Fig. 5a). Dorsal shield fused with peritremal shield at the level of *j1* position, 347 (325 – 378) long and 244 (233 – 250) wide at the level of waist, smooth, with seven solenostomes (*gd1*, *gd2, gd4, gd5, gd6, gd8* and *gd9*), 11 pairs of poroids, 17 pairs of dorsal setae and two pairs of sub-lateral setae: *j1* 33 (30 – 38), *j3* 52 (48 – 56), *j4* 4 (3 – 4), *j5* 4 (3 –

Table 18 Comparison of few diagnostic characters of females *Amblyseius djenaeli* Kreiter **n. sp.** with those of females of close species: *A. lencus* Denmark and Evans (in Denmark and Evans 1999), *A. martus* De Leon (in De Leon 1966), *A. neocinctus* Schicha and Corpuz-Raros (in Schicha and Corpuz-Raros 1992), *A. neofirmus* Ehara and Okada (in Ehara *et al.* 1994), and *A. solani* Ramos and Rodriguez (in Ramos and Rodriguez 1997).

Characters	*A. djenaeli*	*A. lencus*	*A. martus*	*A. neocinctus*	*A. neofirmus*	*A. solani*
j1	33	28	27	24	24	32
j3	52	35	29	48	29	48
s4	91	81	83	78	78	81
Z5	259	301	220	276	268	221
StiIV	80	50	55	82	70	69
StIV	80	58	65	58	67	80
No teeth FD	9	14	11	10	10	9
No teeth MD	3	4	4	3	3	4
Spermatheca	Tubular calyx with parallel margins	Tubular-flared calyx	Tubular calyx with parallel margins	Tube like calyx with a major duct wider than atrium and calyx	Tubular-flared calyx	Tubular with parallel margins

4), *j6* 5 (4 – 5), *J2* 5, *J5* 4 (4 – 5), *z2* 6 (6 – 8), *z4* 6 (5 – 8), *z5* 5, *Z1* 6 (6 – 8), *Z4* 109 (107 – 113), *Z5* 259 (245 – 268), *s4* 91 (89 – 95), *S2* 6 (5 – 8), *S4* 7 (6 – 8), *S5* 6 (5 – 6), *r3* 15 (13 – 16), *R1* 6 (5 – 8). All setae smooth.

Peritreme — (Fig. 5a). Extending to the level of *j1*.

Venter — (Fig. 5b). All shields smooth. Sternal shield with three pairs of setae (*st1, st2, st3*) and two pairs of poroids; one pair of *st4* and one pair of pores on a small metasternal shield; posterior margin of the sternal shield straight. Distances between *st1-st1* 62 (60 – 63), *st2-st2* 69 (65 – 73), *st3-st3* 77 (75 – 80), st1-st3 70 (59 – 93), *st4-st4* 81 (65 – 93). Genital shield length 125 (118 – 130), width at the level of *st5* 77 (75 – 80), width at the level of the posterior corners 85 (83 – 88), distance *st5-st5* 77 (75 – 80). Two pairs of metapodal shields 22 (20 – 23) long and 6 (5 – 8) wide for the larger and 12 (9 – 13) long for the slender. Ventrianal shield with three pairs of preanal setae (*JV1, JV2*, and *ZV2*), and one pair of evolved and crateriform *gv3*, with 15 distance. Membrane surrounding ventrianal shield with four pairs of setae (*ZV1, ZV3, JV4* and *JV5*), and five pairs of round to oblong poroids; ventrianal shield 118 (118 – 120) long, 95 (93 – 98) wide at level of anterior corners (*ZV2*), and 88 (80 – 95) wide at level of paranals setae. *JV5* smooth, 90 (88 – 93) long.

Chelicera — (Fig. 5c). Fixed digit 31 (29 – 33) long with 9 strong teeth; and movable digit 36 (35 – 38) long with 4 strong teeth.

Spermatheca — (Fig. 5d). Spermatheca tubular (Denmark *et al.* 1999), with an elongate calyx with parallel margin 24 (23 – 25) long and 3 wide, an atrium included in the basis of the calyx. Visible small ductus minor and large membranous ductus major.

Legs (Fig. 5e) — Pointed whip-like macrosetae on genua I, II and III, on the tibia III, and on the basitarsus, tibia and genu IV. Measurements: *SgeI* 43 (40 – 45), *SgeII* 41 (38 – 45), *SgeIII* 58 (54 – 60), *StiIII* 49 (43 – 53), *SgeIV* 105 (103 – 110), *StiIV* 80 (75 –85), *StIV* 80 (75 – 83). Genu II and III with seven and six setae, respectively. Chaetotactic formula of genu II: 2-2/0, 2/0-1; genu III: 1-2/0, 2/0-1.

Male — Unknown.

Material examined — 5 ♀♀ in total, all measured, 5 ♀♀ as type material. LeTampon – Grand Tampon, Janick Bénard farm (aasl 861 m, Long 55°32’90” E, Lat 21°12’80” S), 2 ♀♀ on *A. conyzoides*, 1 ♀ on *B. pilosa*, 2 ♀♀ on *R. raphanistrum*, 24/5/2016.

Type material — The holotype female and three paratype females deposited in Montpellier SupAgro – INRA Acarology collection, Montpellier, France; 1 paratype female in Bassin-Plat CIRAD Research Station collection.

Etymology — The name “*djenaeli*” refers to the first name of the stepson of the senior author, Djénaël Gaultier. The species is named in his honour.

Amblyseius herbicolus (Chant)

Typhlodromus (*Amblyseius*) *herbicolus* Chant 1959: 84.
Amblyseius (*Amblyseius*) *herbicolus*, Muma 1961: 287.
Typhlodromus herbicolus, Hirschmann 1962: 23.
Amblyseius herbicolus, Moraes *et al.* 1986: 14; 1989a: 79; Chant & McMurtry 2004a: 208; Moraes *et al.* 2004a: 27; Chant & McMurtry 2007: 78.
Amblyseius deleoni, Muma & Denmark 1970: 68 (synonymy according to Daneshvar & Denmark 1982; Denmark & Muma 1989).
Amblyseius giganticus Gupta 1981: 33 (synonymy according to Gupta 1986).
Amblyseius impactus Chaudhri 1968: 553 (synonymy according to Daneshvar & Denmark 1982; Denmark & Muma 1989); *Amblyseius* (*Amblyseialus*) *thermophilus* Karg 1991: 12 (synonymy according to El-Banhawy & Knapp 2011; Demite *et al.* 2019); *Typhlodromus* (*Amblyseius*) *amitae* Bhattacharyya 1968: 677 (synonymy according to Denmark & Muma 1989).

Amblyseius herbicolus belongs to the *largoensis* species group as setae *J2* and *Z1* are present, setae *s4* are minute and the ventrianal shield of the female is vase-shaped. It belongs to

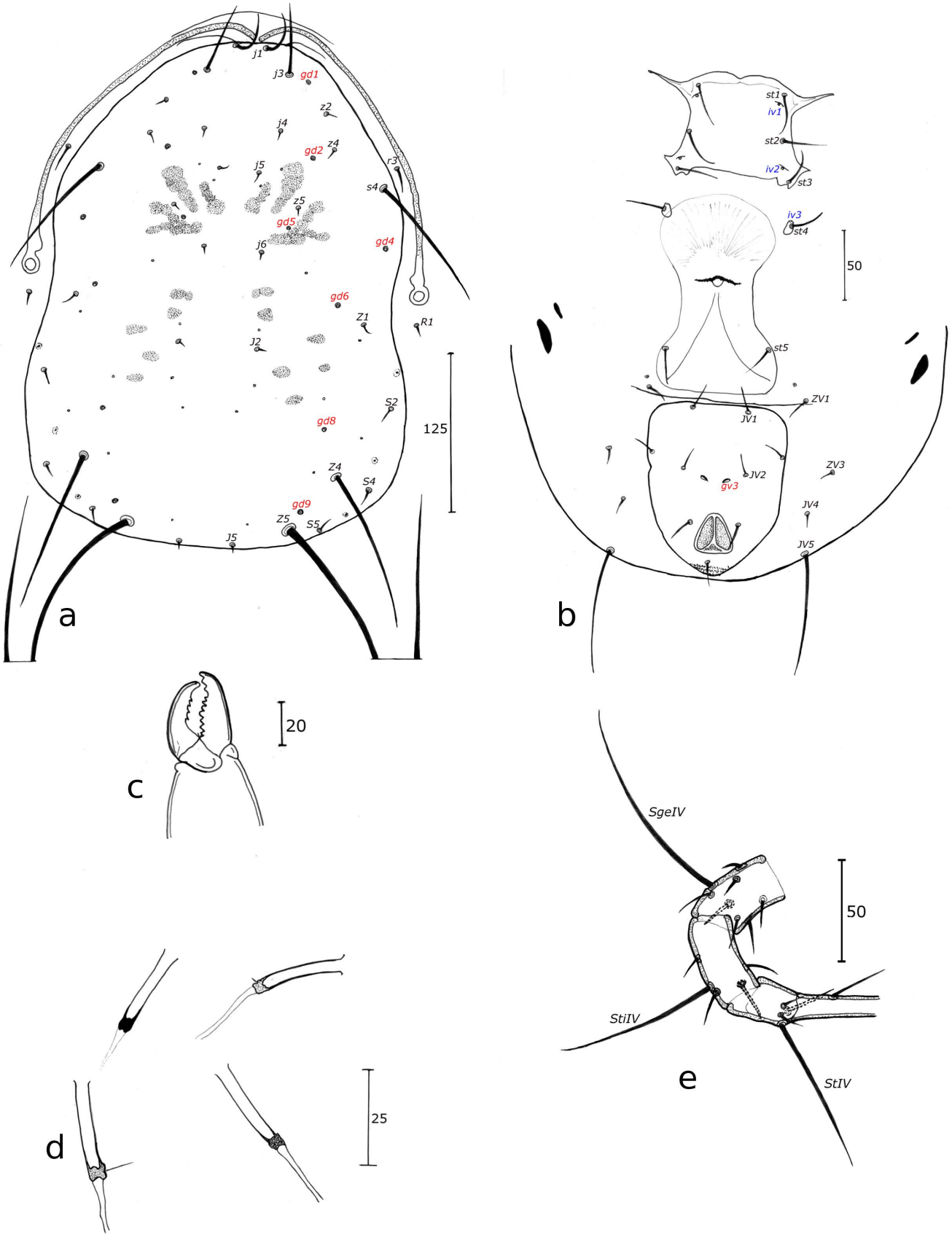

Figure 5 Female of *Amblyseius djenaeli* Kreiter **n. sp.**: a – Dorsal shield and peritreme; b – Ventral shields; c – Chelicera; d – Variants of insemination apparatus; e – Genu; tibia and basitarsus of the leg IV.

the *largoensis* species subgroup as setae Z4 are long, spermatheca has the calyx elongate and the female ventrianal shield is entire (Chant and McMurtry 2004a).

Amblyseius herbicolus is widespread in all tropical and subtropical regions of the world. It is the second most abundant phytoseiid mites on *Coffea arabica* L. in Brazil, associated with *Brevipalpus phoenicis* (Geijskes), vector of the coffee ring spot virus and it was found to be an efficient predator (Reis *et al.* 2007). *A. herbicolus* is also found associated with the broad mite, *P. latus* in crops such as chili pepper (*C. annuum*) in Brazil and has also a good potential for controlling the pest. Rodriguez-Cruz *et al.*(2013) have studied biological, reproductive and life table parameters of *A. herbicolus* on three different diets: broad mites, castor bean pollen (*R. communis*) and sun hemp pollen (*Crotalaria juncea* L.). The predator was able to develop and reproduce on all these three diets. However, its intrinsic growth rate was higher on broad mites and castor bean pollen. Feeding on alternative food such as pollen can facilitate the predator's mass rearing and maintain its population on crops when prey is absent or scarce. Many polyphagous generalist phytoseiid mites are important natural enemies because they can feed on plant provided pollen and various prey species, and thus persist in crops even in the absence of target pests (McMurtry *et al.* 2013). Hence, populations of these predators can be established in a crop by providing alternative food, thus increasing biological control. Alternative food affects *P. latus* control on chilli pepper plants by predatory mites (Duarte *et al.* 2015). *A. herbicolus* had high oviposition and population growth rates when fed with cattail pollen (*Typha latifolia* L.), chilli pepper pollen and bee-collected pollen, and a low rate on the alternative prey *T. urticae*. Supplementing pepper plants with pollen resulted in better control of broad mite populations (Duarte *et al.* 2015). Release of *A. herbicolus* on young plants with weekly addition of honeybee pollen or cattail pollen until plants produce flowers seems a viable strategy to sustain populations of this predator (Duarte *et al.* 2015).

Amblyseius herbicolus was collected recently in Comoros archipelago (Kreiter *et al.* 2018b). It was already well known from La Réunion since previous studies (Quilici *et al.* 1997, 2000). All details of collections were provided in the paper but without any measurements of specimens collected given. Measurements of specimens collected during this study are provided in table 19.

Specimens examined — 114 ♀♀ + 8 im. in total, 15 ♀♀ measured. Saint-Paul – Savannah (aasl 61 m, Long 55°29'43" E, Lat 21°20'41" S), 2 ♀♀ in *P. vulgaris* flowers, 28/7/2015; Les Avirons – Tévelave (aasl 1328 m, Long 55°21'23" E, Lat 21°12'9" S), 1 ♀ on *P. persica*, 11 ♀♀ on *Citrus reticulata* Blanco, 12 ♀♀ on *A. conyzoides*, 2 ♀ on *Psidium guajava* L., 8/12/2015; Le Tampon – Grand Tampon, Janick Bénard farm (aasl 861 m, Long 55°32'90" E, Lat 21°12'80" S), 3 ♀ on *R. raphanistrum,* 24/5/2016, and 1 ♀ on *R. raphanistrum*, 20/9/2016; Petite Île – Piton Bloc, Yébo Luguy farm (aasl 973 m, Long 55°34'6" E, Lat 21°18'64" S), 6 ♀♀ on *Citrus limon* (L.), and 1 ♀ on *P. lanceolata*, 9/12/2015, 1 ♀ on *B. catharticus*, 10 ♀♀ + 1 im. on *P. lanceolata*, 9 ♀♀ + 1 im. on *R. raphanistrum*, 18/10/2016; 14 ♀♀ + 2 im. on *Citrus* sp., and 6 ♀♀ + 2 im. on *S. mauritianum*, 29/11/2016, 4 ♀♀ + 3 im. on *L. camara*, 5 ♀♀ on *Acacia dealbata* Link, and 5 ♀♀ on *P. aquilinum*, 9/1/2017; Montvert-les-Hauts – EARL Le Mont Vert farm (aasl 582 m, Long 55°32'19" E, Lat 21°19'42" S), 1 ♀ on *C. annuum*, 14/12/2015; Ravine Langevin – Grand-Galet Waterfall (aasl 850 m, Long 55°21'33" E, Lat 21°17'47" S), 8 ♀♀ on *Syzigium jambos* L., and 1 ♀ on *D. incanum*, 11/12/2016; Forêt de Bélouve – Gîte (aasl 1500 m, Long 55°33'36" E, Lat 21°6'0" S), 1 ♀ on *Fuchsia boliviana* Carrière, 20/12/2016; Cap Blanc – Waterfall (aasl 1400 m, Long 55°38'24" E, Lat 21°16'48" S), 7 ♀♀ + 1 im. on *Bohemeria macrophylla* Jacq., 3 ♀♀ + 1 im. on *S. jambos*, and 1 ♀ on *Polyscias bernieri* (Baill.), 25/12/2016; Salazie – Voile de la Mariée Road (aasl 798 m, Long 55°32'24" E, Lat 21°2'24" S), 2 ♀♀ on *Morus alba* L., 7/1/2017; Sainte-Rose – Anse des Cascades (aasl 2 m, Long 55°49'34" E, Lat 21°11'6" S), 1 ♀ on *Brillantaisia owariensis* P. Beauv., 21/1/2017.

Remarks — Measurements of 15 females collected in La Réunion (Table 19) agree well with those of females from Grande Comore (Kreiter *et al.* 2018b) and females of Kenya (El-Banhawy and Knapp 2011).

Table 19 Character measurements of adult females of *Amblyseius herbicolus* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	La Réunion	Africa	Grande Comore	Kenya	Senegal	Thailand	Turkey	Holotype Portugal
	15, this study	8	2	46	2	1	3	1
Dsl	**359** (343 – 390)	352 (325 – 368)	385 – 428	335	360 – 365	360	313 – 352	369
Dsw	**240** (225 – 265)	256 (240 – 274)	263 – 275	190	250 – 268	194	196 – 221	236
j1	**35** (33 – 38)	37 (34 – 40)	40 – 43	32	35 – 38	37	33 – 38	38
j3	**40** (38 – 45)	49 (38 – 58)	53 – 55	37	38 – 45	38	32 – 39	42
j4	**7** (5 – 8)	6 (5 – 8)	6	4 – 6	6 – 8	6	8 – 9	9
j5	**5** (5 – 5)	4 (3 – 5)	5	4 – 6	4	5	7 – 8	7
j6	**7** (5 – 8)	7 (5 – 8)	5 – 6	4 – 6	8	8	6 – 7	11
J2	**8** (8 – 10)	10 (8 – 11)	8 – 10	4 – 6	8 – 9	9	8 – 9	12
J5	**8** (8 – 10)	8 (6 – 10)	10	4 – 6	8 – 10	7	9 – 10	9
r3	**12** (10 – 13)	14 (11 – 16)	8 – 15	10	10 – 11	13	10 – 16	15
R1	**10** (10 – 13)	9 (8 – 10)	10 – 13	10	9 – 10	9	8 – 9	8
s4	**98** (95 – 108)	113 (98 – 130)	120 – 125	92	123 – 135	95	86 – 96	100
S2	**12** (10 – 13)	12 (8 – 14)	13	10	13 – 15	10	10 – 12	11
S4	**11** (8 – 13)	11 (8 – 13)	13	10	8 – 10	11	9 – 11	13
S5	**9** (8 – 10)	9 (8 – 10)	13	10	8 – 10	9	9 – 10	11
z2	**13** (8 – 18)	11 (8 – 16)	6 – 8	6	8 – 9	13	9 – 12	13
z4	**10** (8 – 13)	8 (8 – 10)	8	6	10 – 11	10	8 – 12	9
z5	**5** (5 – 8)	6 (5 – 6)	5	6	7 – 9	7	6 – 7	6
Z1	**12** (10 – 13)	10 (8 – 13)	8	10	8 – 10	13	9 – 12	9
Z4	**99** (93 – 108)	126 (101 – 152)	133 – 135	90	163 – 172	94	91 – 99	110
Z5	**255** (248 – 273)	281 (251 – 306)	288 – 300	232	310 – 345	270	220 – 251	236
st1-st1	**66** (63 – 68)	-	68	-	-	-	-	-
st2-st2	**73** (65 – 78)	71 (66 – 75)	73 – 75	69	75 – 78	73	70 – 73	-
st3-st3	**77** (73 – 83)	-	63 – 65	-	-	-	-	-
st1-st3	**69** (68 – 73)	65 (58 – 70)	73 – 75	62	63 – 65	67	64 – 69	-
st4-st4	**76** (73 – 80)	-	78 – 83	-	-	-	-	-
st5-st5	**65** (63 – 70)	71 (67 – 75)	70 – 78	65	65 – 70	68	58 – 64	-
Lisl	**22** (18 – 25)	-	23	-	-	-	-	-
Lisw	**5** (5 – 5)	-	5	-	-	-	-	-
Sisl	**14** (10 – 18)	-	13	-	-	-	-	-
Vsl	**111** (100 – 123)	116 (112 – 118)	120 – 135	108	113 – 115	117	102 – 117	-
Vsw *ZV2*	**48** (43 – 58)	57 (53 – 59)	63	48	65 – 69	56	44 – 48	-
Vsw *anus*	**69** (63 – 78)	71 (66 – 77)	80	69	75 – 78	70	61 – 69	-
JV5	**61** (53 – 78)	-	80 – 85	52	-	-	51 – 60	-
SgeI	**44** (40 – 48)	42 (35 – 48)	45 – 48	-	43 – 48	50	40 – 48	-
SgeII	**37** (33 – 40)	38 (35 – 42)	38	52	38 – 40	39	34 – 39	-
SgeIII	**44** (35 – 48)	52 (45 – 59)	53 – 58	41	48 – 52	48	41 – 46	-
StiIII	**41** (38 – 48)	41 (34 – 48)	43	35	43 – 45	40	33 – 40	-
SgeIV	**118** (110 – 123)	124 (96 – 158)	135	110	160 – 162	110	98 – 128	112
StiIV	**88** (83 – 93)	90 (67 – 109)	100	76	102 – 115	85	75 – 89	82
StIV	**72** (65 – 78)	76 (66 – 86)	80	65	76 – 78	72	63 – 70	76
Scl	**31** (28 – 33)	-	38 – 40	28	33 – 35	25	24 – 32	18
Scw	**5** (5 – 8)	-	02-mars	-	-	-	-	-
Fdl	**36** (30 – 40)	31 (30 – 31)	33	-	-	34	29 – 36	-
No teeth Fd	**13**	10 + 1p	11 – 12	8	-	-	12	11 – 12
Mdl	**33** (28 – 35)	35 (34 – 35)	30	-	-	35	31 – 33	-
No teeth Md	**4 small**	3	-	3	-	-	4	4

Sources of measurements – Africa (Benin 1♀, Burundi 1♀, Democratic Republic of Congo 1♀, Ghana 1♀, Kenya 3♀♀, Rwanda 1♀): Zannou *et al.* (2007); Grande Comore: Kreiter *et al.* (2018b); Kenya: El-Banhawy & Knapp (2011); Senegal: Kade *et al.* (2011); Thailand: Oliveira *et al.* (2012); Turkey: Akyazi *et al.* (2016); Holotype Portugal: Denmark & Muma (1989); - : not provided.

The species was described as *Amblyseius deleoni* Muma and Denmark and synonymized after by Daneshvar and Denmark (1982) and Denmark and Muma (1989) with *A. herbicolus*. Although Muma and Denmark (1970) reported males of *A. herbicolus* from Florida, there are no other records of males from other regions of the world in the whole literature. Whereas the male of *A. deleoni* has been described from Florida, it has not been found on leaf samples taken on a regular basis over five years from citrus leaves in New South Wales, Australia (Schicha 1981c). Blommers (1976) failed also to observe even a single male in the mass rearing of the species in Madagascar. Van der Merwe (1968) and McMurtry (unpublished obs. but mentioned in McMurtry and Moraes 1984) confirmed thelytoky in populations of *A. herbicolus* from South Africa and California, respectively, by rearing isolated immatures to adult females and observing reproduction of these females.

Males collected in this study appear to be compatible with the description of adult males of *A. herbicolus*. Unfortunately, they were collected alone, without females or any association link with a nearby (female) population of *A. herbicolus*. So they cannot be reliably identified as males of *A. herbicolus*. We have collected 114 females from different localities, habitats and plants of the Island, with and no sign of males despite females sometimes collected in high densities. The thelytoky of this species is thus strongly suspected.

Amblyseius longipilus (Kreiter & Ueckermann)

Proprioseiopsis longipilus Kreiter & Ueckermann in Kreiter *et al.* 2002: 341.
Amblyseius longipilus, Chant & McMurtry 2004a: 205; 2007: 78.

Amblyseius longipilus belongs to the *pusillus* species group as setae J2 are absent. It was placed in the original description in the genus *Proprioseiopsis* but the female ventrianal shield is narrow and they are more lightly sclerotized. However, specimens of *A. longipilus* are brownish in colour (Chant and McMurtry 2004a).

The biology of this species remains totally unknown. *A. longipilus* has been described previously by Kreiter *et al.*(2002) from La Réunion but have never been recorded from other countries or record again in La Réunion since its description. So this is the first new record since the original description.

Specimens examined: 3 ♀♀ in total, all measured. Le Tampon – Grand Tampon, Janick Bénard farm (aasl 861 m, Long 55°32'90" E, Lat 21°12'80" S), 1 ♀ on *Rubus alceifolius* poiret, 7/1/2016; Saint-Pierre – Domaine Vidot (aasl 826 m, Long 55°34'12" E, Lat 21°18'45" S), 1 ♀ on *Viburnum tinus* L., 18/1/2017; Le Tampon – Grand Tampon (aasl 1100 m, Long 55°32'49" E, Lat 21°16'48" S), 1 ♀ on *S. mauritianum*, 18/1/2017.

Remarks: the single description available in the literature is the original description of Kreiter *et al.*(2002). Measurements obtained in this study (Table 20) fit well with those of the original description, except for *JV5* that is a far greater in the new specimens collected in this study. JV5 setae were measured 16 (13 – 18) in the original description and this very small size is quite surprising for setae belonging to an *Amblyseius* species.

We have measured again these setae in 11 specimens, 1 holotype and 10 paratype females and we found 69 (63 – 75) (11), very close to the value for the three specimens found in this study.

The first values published were a mistake of measurements and they must be replaced by value of the table 20.

Amblyseius neoankaratrae Ueckermann & Loots

Amblyseius neoankaratrae Ueckermann & Loots 1988: 92.
Amblyseius neoankaratrae Ferragut & Baumann 2019: 816.

This brown-reddish species was collected in numbers in high altitude > 1000 m aasl. This species is peculiar in the genus *Amblyseius* by having ratios s4 / Z1 and s4 / S2 <3.1, by the shortness of setae *Z4* and by the absence of macroseta on tarsus IV. Like *A. herbicolus*, it

belongs to the *largoensis* species group as setae *J2* and *Z1* are present, setae *s4* are minute and the ventrianal shield of the female is vase-shaped. It belongs to the species subgroup *ankaratrae* as setae *Z4* are short. Only two species are in the subgroup *ankaratrae* and another one in the close species subgroup *nahatius* with only one species. *Amblyseius nahatius* is very different from the two first with its divided ventrianal shield, its shorter setae, and very different insemination apparatus.

This species seems to live in high altitude habitats, such as *T. maelliae* **n. sp.** and *T. mickaeli* **n. sp.** with which it makes apparently mixed colonies. The biology of that species is totally unknown.

The male of that species was unknown until now and is described thereafter.

This is the first mention of this species in another country than South Africa and Mauritius and the first mention from La Réunion Island.

Specimens examined: 72 ♀♀ + 20 ♂♂ + 12 im. in total, 20 ♀♀ + 12 ♂♂ measured. Le Tampon – Notre-Dame-de-la-Paix Forest (aasl 1600 m, Long 55°35'50" E, Lat 21°15'50" S), 2 ♀♀ + 1 ♂ on *Monimia rotundifolia* Pet.-Th., 19/12/2016; Cap Blanc – Waterfall (aasl 1400 m, Long 55°38'24" E, Lat 21°10'48" S), 1 ♀ on *P. bernieri*, 25/12/2016; Bras noir – Waterfall (aasl 1515 m, Long 55°32'60" E, Lat 21°06'36" S), 4 ♀♀ on *Tambourissa elliptica* A. DC., 26/12/2016; Forêt de Bélouve – Gîte (aasl 1500 m, Long 55°33'36" E, Lat 21°6'0" S), 13 ♀♀ on *Claoxylon glandulosum* Boivin ex Baill., 20/12/2016, and 3 ♀♀ + 1 ♂ + 1 im. on *C. borbonica*, 1 ♀ on *W. macrostachya*, 4 ♀♀ + 1 ♂ + 2 im. on *Cryptomeria japonica* (Thunb. ex L.f.), 2 ♀♀ + 2 ♂♂, on *E. japonica*, 28/1/2017; Forêt de Bélouve – Trou de fer (aasl 1300 m, Long 55°33'36" E, Lat 21°2'24" S), 1 ♀ on *Erica arborescens*, 2 ♀♀ on *A. heterophylla*, 1 ♀ + 1 ♂ on *Passiflora tripartita* (Juss.) Poir., 28/1/2017; Le Maïdo – Summit (aasl 2205 m, Long 55°23'16" E, Lat 21°04'08" S), 1 ♀ on *C. japonica*, 18/2/2017; Forêt de Sans Souci – Ilet Alcide, (aasl 1452 m, Long 55°22'07" E, Lat 21°01'17" S), 8 ♀♀ on *Coffea mauritiana* Lam., 6 ♀♀ + 4 ♂♂ on *Cyathea glauca* Bory, 1 ♀ on *Aphloia theiformis* (Vahl) Benn., 16 ♀♀ + 4 ♂♂ + 4 im. on *Boehmeria macrophylla* Hornem., 5 ♀♀ + 6 ♂♂ + 3 im. on *Eriobotrya E. japonica*, 1 ♀ + 2 im. on *Psiadia montana* (Cordem.) Baill., 18/11/2018.

Remarks: measurements values (Table 21) are very close from those of the literature, especially from those recently published by Ferragut and Baumann (2019) concerning specimens from Mauritius.

Table 20 Character measurements of adult females of *Amblyseius longipilus* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	La Réunion 3, this study	La Réunion types 14	Characters	La Réunion 3, this study	La Réunion types 14	Characters	La Réunion 3, this study	La Réunion types 14
Dsl	**346** (330 – 353)	349 (309 – 411)	*z2*	**8**	10 (8 – 11)	Sisl	**15**	13
Dsw	**237** (230 – 250)	217 (193 – 235)	*z4*	**10** (9 – 10)	12 (10 – 16)	Vsl	**117** (108 – 125)	116 (108 – 124)
j1	**32** (28 – 35)	35 (31 – 39)	*z5*	**6** (4 – 8)	6 (5 – 8)	Vsw *ZV2*	**76** (65 – 93)	72 (66 – 77)
j3	**46** (43 – 50)	46 (43 – 48)	*Z1*	**9** (8 – 10)	11 (10 – 13)	Vsw *anus*	**78** (73 – 80)	73 (68 – 79)
j4	**6** (4 – 8)	6 (5 – 10)	*Z4*	**129** (105 – 143)	133 (118 – 148)	*JV5*	**69** (68 – 70)	**69** (63 – 75) (11)*
j5	**4** (3 – 5)	6 (5 – 8)	*Z5*	**253** (240 – 258)	242 (229 – 253)	*SgeI*	**42** (41 – 43)	41 (39 – 42)
j6	**5** (4 – 8)	9 (6 – 13)	*st1-st1*	**65** (60 – 69)	**68** (65 – 70) (11)*	*SgeII*	**39** (38 – 40)	39 (35 – 42)
J5	**7** (5 – 8)	10 (8 – 11)	*st2-st2*	**75** (69 – 78)	75 (69 – 80)	*SgeIII*	**47** (45 – 48)	49 (48 – – 53)
r3	**18** (15 – 23)	21 (16 – 26)	*st3-st3*	**83** (78 – 85)	**84** (80 – 88) (11)*	*StiIII*	**37** (35 – 38)	39 (37 – 45)
R1	**13**	13 (10 – 16)	*st1-st3*	**65** (63 – 68)	65 (61 – 68)	*SgeIV*	**113** (113 – 115)	113 (105 – 121)
s4	**116** (113 – 120)	114 (108 – 129)	*st4-st4*	**68** (73 – 85)	**81** (70 – 93) (11)*	*StiIV*	**82** (80 – 85)	82 (80 – 85)
S2	**10** (8 – 13)	13 (13 – 16)	Gensl	**111** (110 – 113)	**124** (118 – 133) (11)*	*StIV*	**85** (78 – 93)	89 (85 – 93)
S4	**11** (8 – 13)	13 (13 – 16)	Gensw *st5*	**75**	**78** (70 – 80) (11)*	Scl	**10** (8 – 15)	**8** (5 – 10) (11)*
S5	**10** (8 – 13)	14 (13 – 16)	Gensw post. corn.	**74** (73 – 75)	**75** (68 - 80) (11)*	Scw	**9** (5 – 18)	**9** (8 – 13) (11)*
			st5-st5	**71** (68 – 73)	69 (64 – 74)	Fdl, No teeth Fd	**37** (35 – 38), **13**	36 (34 – 39), **13***
			Lisl	**23** (23 – 25)	21	Mdl, No teeth Md	**38, 3**	37 (35 – 40), 3
			Lisw	**6** (5 – 8)	5			

Sources of measurements – La Réunion: this study; La Réunion types: Kreiter *et al.* (2002b); - : not provided.
*New measurements on type material (1 holotype and 10 paratype females).

Table 21 Character measurements of adult female specimens of *Amblyseius neoankaratrae* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	La Réunion	Mauritius	South Africa
	20, this study	4	2
Dsl	**360** (313 – 425)	317 (311 – 324)	315 – 337
Dsw	**256** (208 – 312)	198 (193 – 207)	208 – 230)
Perit. ext. and *gd*	***j1* , 7** (*gd1, 2, 4, 5, 6, 8, 9*)	*j1* , 7 (*gd1, 2, 4, 5, 6, 8, 9*)	*j1* , 6
j1	**19** (13 – 23)	18 (17 – 19)	16 – 19
j3	**27** (25 – 30)	23 (21 – 24)	28
j4	**9** (8 – 10)	8 (7 – 8)	13
j5	**9** (8 – 13)	7 (7 – 8)	13
j6	**10** (5 – 13)	9 (9 – 10)	13
J2	**10** (5 – 12)	10 (9 – 11)	13 – 16
J5	**7** (5 – 8)	7 (6 – 7)	9
r3	**10** (5 – 13)	9 (8 – 9)	9
R1	**9** (8 – 13)	10 (9 – 10)	13
s4	**35** (33 – 38)	30 (30 – 31)	32
S2	**13** (8 – 15)	11 (10 – 12)	15 (13 – 16)
S4	**11** (10 – 13)	10	13
S5	**9** (5 – 10)	5 (5 – 6)	13
z2	**11** (10 – 13)	8	13
z4	**10** (8 – 13)	7 (6 – 7)	13
z5	**9** (8 – 13)	6 (6 – 7)	13
Z1	**11** (8 – 13)	10 (9 – 10)	16
Z4	**15** (13 – 18)	14 (13 – 15)	13 – 14
Z5	**144** (125 – 168), slight. ser.	137 (131 – 143), slight.ser.	164 – 172, ser.
st1-st1	**53** (50 – 58)	-	-
st2-st2	**64** (53 – 70)	59 (57 – 60)	54 – 57
st3-st3	**71** (66 – 75)	-	-
st1-st3	**61** (58 – 65)	56 (55 – 57)	50
st4-st4	**76** (63 – 85)	-	-
Gensl	**121** (113 – 130)	107 (105–109)	-
Gensw *st5*	**71** (65 – 75)	61 (57–63)	-
Gensw post. corn.	**75** (70 – 80)	68 (68–69)	-
st5-st5	**64** (58 – 73)	61 (57 – 63)	54 – 57
Lisl	**25** (20 – 45)	20 (19 – 20)	-
Lisw	**5** (5 – 8)	-	-
Sisl	**12** (11 – 18)	13 (12 – 13)	-
Vsl	**97** (75 – 120)	85 (83 – 87)	88 – 95
Vsw *ZV2*	**68** (60 – 75)	59 (54 – 63)	54
Vsw *anus*	**70** (73 – 83)	65 63 – 67)	63 – 67
No *gv3* , distance	**2, 21** (18 – 25) distance	2, 20 (18 – 21)	2
JV5	**18** (13 – 20)	16 (15 – 16)	21
SgeI	**31** (25 – 35)	25 (24 – 26)	32 – 35
SgeII	**30** (25 – 35)	26 (25 – 27)	32
SgeIII	**34** (30 – 37)	30 (29 – 30)	35 – 38
StiIII	**27** (23 – 33)	23 (22 – 23)	28 – 32
SgeIV	**72** (38 – 83)	66 (65 – 67)	85
StiIV	**67** (55 – 79)	59 (56 – 63)	76 – 82
StIV	**26** (20 – 35)	16 (15 – 17)	No macrosetae
Calyx l	**17** (13 – 23)	19 (18 – 20)	13
Scw	**12** (10 – 25)	16 (15 – 18)	-
Fdl, No teeth Fd	**32** (28 – 35), **3 + 12**	27 (26 – 28), 3 + 10	28, -
Mdl, No teeth Md	**33** (28 – 38), **4**	28 (27 – 38), 3	28, 0

Sources of measurements – Mauritius: Ferragut & Baumann (2019); South Africa: Ueckermann & Loots (1988) and Zannou *et al.* (2007). - : not provided.

In La Réunion Island, it was collected in altitude > 1,000 m aasl. In Mauritius, it was collected at 678 m aasl, which is amongst the highest elevation in that island.

We have no indications of the altitude of collection for the holotype from South Africa but it seems that this species is only met in the highest part of regions in which it is present.

Description of the adult male of *Amblyseius neoankaratrae*

n = 20 (Figs 6 a – c)

Body brown-reddish. See at the end of this description, in remarks paragraph for diagnosis.

Dorsum — (Fig. 6a). Dorsal shield fused with peritremal shield at the level position of j1 position, smooth, 278 (258 – 293) long and 197 (178 – 215) wide, with 7 solenostomes as in females. The dorsal shield bears 17 pairs of dorsal setae and 2 pairs of sub-lateral setae: *j1* 19 (18 – 20), *j3* 30 (28 – 33), *j4* 8, *j5* 8 (8 – 10), *j6* 8 (8 – 9), *J2* 10 (8 – 10), *J5* 6 (5 – 8), *z2* 10 (5 – 13), *z4* 10 (8 – 13), *z5* 8, *Z1* 10, *Z4* 19 (15 – 20), *Z5* 122 (109 – 125), *s4* 30 (10 – 35), *S2* 12 (10 – 13), *S4* 8 (5 – 10), *S5* 8, *r3* 10 (5 – 12), *R1* 8 (5 – 10). All setae smooth except *Z5* that is very slightly serrated.

Peritreme — (Fig. 6a). Extending to the level of *j1*.

Venter — (Fig. 6b). All shields are slightly reticulated: the sternogenital shield is smooth except for areas near margin and the posterior fourth of the shield; in contrast, the ventrianal shield is lineate throughout. Distances between *st1 – st1* 46 (43 – 48), *st2 – st2* 54 (50 – 55), *st3 - st3* 46 (43 – 48), *st1 – st5* 114 (110 – 118), *st4 - st4* 38 (35 – 40), *st5 – st5* 29 (25 – 33). Two pairs of lyrifissures and one pair of poroids on the sternal shield. Ventrianal shield with three pairs of pre-anal setae, *JV1*, *JV2*, and *VZ2*, a pair of conspicuous crateriform *gv3* very close to and just behind setae *JV2* (ratio *JV2-JV2* / *gv3-gv3* = 1 JV1, JV2 and ZV2 are inserted in the center of ventrianal shield particularly close to each other. Four pairs of poroids. Membrane surrounding ventrianal shield with one pair of setae *JV5*; ventrianal shield 108 (100 – 113) long, 128 (123 – 138) wide at anterior corners and 50 (45 – 60) wide at level of *anus*. *JV5* smooth, 16 (10 – 20) long. A pair of lyrifissures near *JV5*.

Chelicera — Fixed digit 23 (20 – 25) long, with 6 teeth and movable digit 23 (23 – 25) long with 3 teeth. Spermatodactyl L-shaped, with a moderately elongate shaft (Fig. 6c) 15 (8 – 23) with a wide toe 10 (10 – 12) long.

Legs — Like in female, a pair of macrosetae on the genu of the Leg I and II, two pairs of macrosetae on genua and tibia of Leg III, three macrosetae slightly knobbed on the leg IV, on the basitarsus, tibia and genu. *SgeI* 26 (25 – 28), *SgeII* 25 (25 – 26), *SgeIII* 24 (23 – 25), *StiIII* 18 (16 – 23), *SgeIV* 50 (48 – 53), *StiIV* 55 (50 – 63), *StIV* 20 (20 – 23). Chaetotactic formula of genua II and III similar to females.

Specimens examined — (males): 20 ♂♂ in total, 12 ♂♂ measured, 20 ♂♂ as type material (see below). Le Tampon – Notre-Dame-de-la-Paix Forest (aasl 1600 m, Long 55°35'50" E, Lat 21°15'50" S), 1 ♂ on *M. rotundifolia*, 19/12/2016; Forêt de Bélouve – Gîte (aasl 1500 m, Long 55°33'36" E, Lat 21°6'0" S), 1 ♂ on *C. borbonica*, 1 ♂ on *C. japonica*, 2 ♂♂ on *E. japonica*, 28/1/2017; Forêt de Bélouve – Trou de fer (aasl 1300 m, Long 55°33'36" E, Lat 21°2'24" S), 1 ♂ on *P. tripartita*, 28/1/2017; Forêt de Sans Souci – Ilet Alcide, (aasl 1452 m, Long 55°22'07" E, Lat 21°01'17" S), 4 ♂♂ on *C. glauca*, 4 ♂♂ on *B. macrophylla*, 6 ♂♂ on *E. japonica*, 18/11/2018.

Type material — 20 paratype males and 3 paratype immatures deposited in Montpellier SupAgro – INRA Acarology collection, Montpellier, France.

Remarks — The male of *A. neoankaratrae* has relatively unique combination of characters that can allow to distinguish easily it from males of other species of *Amblyseius*, even in species subgroups *ankaratrae* and *nahatius*. It has very short setae *Z4* permitting to distinguish it from any other males of all other species group of *Amblyseius*. Concerning the species subgroup *ankaratrae* and *nahatius*, with two and one species described in these subgroups, respectively, the only male described is for *Amblyseius ankaratrae* Blommers. The male of *A. neoankaratrae* can be distinguish from the male of *A. ankaratrae* by longer *Z4* (19 *vs* 9) and *s4* (30 *vs* 13), shorter *Z5* (122 *vs* 170) and macrosetae of leg IV (50 and 55 *vs* 70 and 64 for genu and tibia,

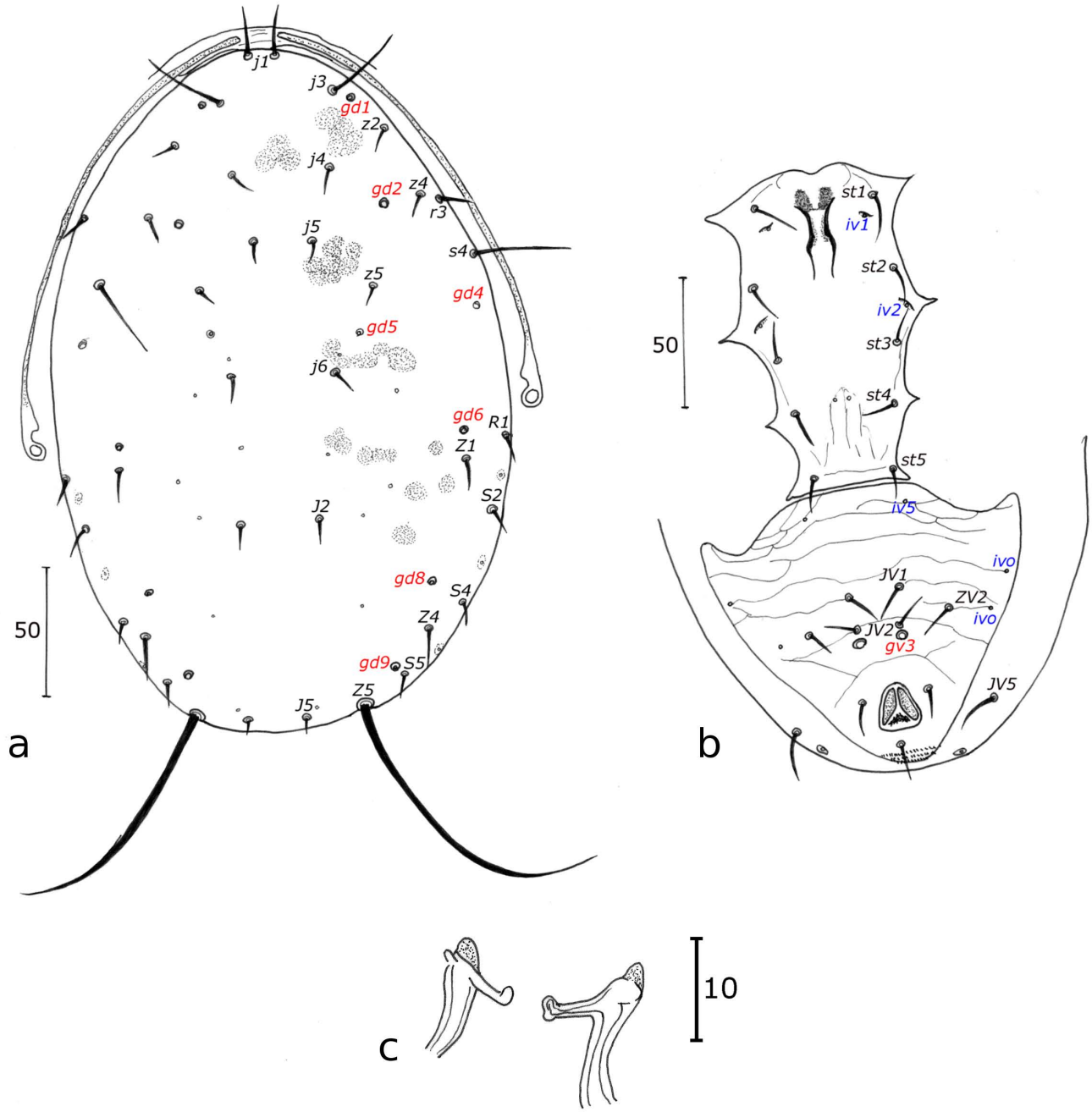

Figure 6 Male of *Amblyseius neoankaratrae* Ueckermann and Loots: a – Dorsal shield and peritreme, b – Ventral shield, c – Spermatodactyl

respectively), the presence of a macroseta on the basitarsus IV, less teeth on the fixed digit (6 *vs* 7) and a longer toe in the spermatodactyl (10 *vs* 7).

Amblyseius tamatavensis Blommers

Amblyseius tamatavensis Blommers 1974: 144; Moraes *et al.* 1986: 31; Denmark & Muma 1989: 13; Chant & McMurtry 2004a: 203; Ehara & Amano 2004: 17; Moraes *et al.* 2004a: 52; Chant & McMurtry 2007: 81.
Amblyseius (*Amblyseius*) *tamatavensis*, Ehara 2002: 33; Ehara & Amano 2002: 322.

Amblyseius aegyptiacus, Denmark & Matthysse in Matthysse & Denmark 1981: 343 (synonymy according to Denmark & Muma 1989)
Amblyseius maai Tseng 1976: 123 (synonymy according to Denmark & Muma 1989).

Amblyseius tamatavensis belongs to the *obtusus* species group as setae *J2* and *Z1* are present, setae z4 are minute and the female ventrianal shield is not vase-shaped or divided. It belongs to the *aerialis* species subgroup (46 species) as the calyx of the spermatheca is tubular (Chant and McMurtry 2004a).

It seems to fit the functional type III-b (generalist predators living on glabrous leaves) group defined by McMurtry *et al.*(2013). Cavalcante *et al*. (2017) reported this species as a promising natural enemy of *B. tabaci*. Experimental releases of this predator on caged plants in a screenhouse caused the reduction of the density of *B. tabaci* on pepper plants by up to 60-80 % (Massaro and Moraes 2019). It can be easily produced in large numbers (Massaro *et al.* 2018) when fed with astigmatine mites, which could allow the mass production for augmentative biological control. This species is reported in tropical areas from over 20 countries around the world (Africa, Asia, America and Oceania). It was already well known from La Réunion since previous studies (Quilici *et al.* 2000). All details of collections were provided in this paper but without any measurements of specimens collected given. Measurements of specimens collected during this study are provided in table 22.

Specimens examined: 212 ♀♀ + 44 ♂♂ + 30 im. in total, 11 ♀♀ + 5 ♂♂ measured. Petite Île – Les bas, Doris Morel farm (aasl 230 m, Long 55°34'1" E, Lat 21°21'22" S), 1 ♀ on *A. viridis*, 3 ♀♀ on *M. coromandelianum*, 5 ♀♀ on *A. conyzoides,* and 1 ♀ on *Synedrella nodiflora* (L.) Gaertn., 10/12/2015; 8 ♀♀ on *L. camara*, 2 ♀♀ on *Solanum nigrum* L., 3 ♀♀ on *P. americana,* 5 ♀♀ on *Convolvulus farinosus* L., 4 ♀♀ + 1 im. on *P. lanceolata*, 12/12/2015; 3 ♀♀ + 2 ♂♂ + 1 im. on *P. lanceolata*, 3 ♀♀ + 1 ♂ *S. nodiflora*, 31/05/2016; 1 ♀ + 1 ♂ + 1 im. on *Oxalis corniculata* L., 7 ♀♀ + 1 ♂ on *D. incanum*, 1 ♀ + 1 im. on *S. nodiflora*, 1 ♀ on *B. pilosa*, 1 ♂ on *P. lanceolata,* 6 ♀♀ + 1 ♂ + 1 im. on *Citrus limon* (L.) Osbeck, 1/12/2016; Le Tampon – Grand Tampon, Janick Bénard farm (aasl 861 m, Long 55°32'90" E, Lat 21°12'80" S), 3 ♀♀ + 1 im. on *B. pilosa*, and 1 ♀ on *P. lanceolata,* 20/9/2016; Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 2 ♀♀ on *E. hypericifolia,* 1/11/2015; 56 ♀♀ + 10 ♂♂ + 10 im. in plot H; 6 ♀♀ + 10 ♂♂ in plot HM, 23 and 25/8/2016; 88 ♀♀ + + 17 ♂♂ + 14 im. in plot M; 2 ♀♀ + 1 ♂ in plot CC, 15/12/2016.

Remarks: measurements values (Table 22) are very close from that of the literature, especially from those concerning specimens from South-East Asia.

Sub-tribe Proprioseiopsina Chant & McMurtry

Proprioseiopsina Chant & McMurtry, 2004a: 219.

Genus *Proprioseiopsis* Muma

Proprioseiopsis Muma, 1961: 277.

Proprioseiopsis mexicanus (Garman)

Amblyseiopsis mexicanus Garman 1958: 75.
Amblyseius mexicanus, Moraes & McMurtry 1983: 134.
Proprioseiopsis mexicanus, Muma & Denmark 1970: 48; Denmark & Muma 1973: 237; Moraes *et al.* 1986: 118; Kreiter & Moraes 1997: 379; Moraes *et al.* 2004a: 181; Chant & McMurtry 2005a: 13, 2007: 89.
Proprioseiopsis amotus (Zack) (Synonymy according to Denmark & Evans 2011).
Proprioseiopsis asetus (Chant) (Synonymy according to Denmark & Evans 2011).
Proprioseiopsis clausae (Muma) (Synonymy according to Denmark & Evans 2011).
Proprioseiopsis kogi (Chant & Hansell) (Synonymy according to Denmark & Evans 2011).

Proprioseiopsis putmani (Synonymy according to Denmark & Evans 2011).
Proprioseiopsis temperellus (Denmark & Muma) (Synonymy according to Denmark & Evans 2011); *Proprioseiopsis tropicanus* (Garman) (Synonymy according to Denmark & Evans 2011).
Proprioseiopsis tulearensis (Blommers) (Synonymy according to Denmark & Evans 2011).
*Proprioseiopsis versutus (*Zack) (Synonymy according to Denmark & Evans 2011).

Proprioseiopsis mexicanus belongs to the *belizensis* species group as genu I have no

Table 22 Character measurements of adult females and males of *Amblyseius tamatavensis* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	♀						♂			
	La Réunion 11, this study	**Africa** 10	**Brazil** 7	**Dominican Republic** 5	**Thailand** 9	**Holotype Madagascar** 1	**La Réunion** 5, this study	**Ghana** 1	**Brazil** 2	**Thailand** 1
Dsl	**320** (295 – 338)	354 (328 – 390)	352 (323 – 379)	337 (320 – 350)	337 (310 – 360)	340	**248** (245 – 250)	273	259 – 292	254
Dsw	**240** (223 – 288)	237 (218 – 256)	216 (182 – 238)	216 (200 – 228)	213 (190 – 230)	250	**169** (150 – 195)	187	177 – 179	170
j1	**30** (25 – 35)	31 (26 – 40)	33 (31 – 36)	28 (25 – 30)	32 (28 – 37)	32	**24** (21 – 25)	25	27 – 29	25
j3	**52** (48 – 55)	50 (38 – 59)	53 (50 – 57)	48 (43 – 50)	52 (49 – 55)	54	**42** (40 – 45)	42	43 – 45	40
j4	**4** (3 – 5)	5 (5 – 8)	5 (4 – 5)	4 (2 – 6)	5 (4 – 5)	4	**4** (4 – 5)	5	4 – 5	5
j5	**3** (3 – 5)	4 (3 – 5)	4 (3 – 4)	3 (2 – 4)	4 (3 – 4)	3	**3** (3 – 4)	5	3 – 4	3
j6	**3** (3 – 5)	6 (5 – 8)	5 (5 – 6)	3 (3 – 4)	5 (4 – 6)	3	**3** (3 – 4)	5	5	4
J2	**4** (3 – 5)	7 (5 – 8)	6 (5 – 6)	4 (4 – 5)	5 (5 – 7)	5	**4** (4 – 5)	5	5	5
J5	**6** (4 – 8)	8 (5 – 10)	7 (6 – 7)	5 (4 – 6)	6 (4 – 7)	6	**5** (4 – 8)	5	7	6
r3	**13** (10 – 15)	15 (14 – 18)	14 (13 – 16)	12 (11 – 13)	14 (9 – 17)	15	**12** (10 – 13)	11	11 – 12	11
R1	**5** (5 – 7)	8 (6 – 10)	8 (7 – 8)	7 (6 – 8)	7 (6 – 8)	5	**5** (5 – 6)	-	7	6
s4	**85** (80 – 90)	87 (77 – 96)	91 (90 – 92)	83 (76 – 88)	86 (80 – 92)	88	**68** (58 – 90)	62	67 – 69	65
S2	**5** (4 – 8)	8 (6 – 10)	7 (6 – 7)	7 (5 – 8)	7 (6 – 9)	5	**5** (5 – 6)	6	6 – 7	6
S4	**5** (4 – 6)	8 (6 – 10)	6 (6 – 7)	7 (5 – 8)	6 (5 – 9)	6	**4**	6	5 – 6	5
S5	**5** (5 – 6)	8 (6 – 10)	6 (5 – 6)	5 (4 – 7)	6 (5 – 9)	6	**4**	6	5	5
z2	**5** (5 – 6)	9 (8 – 11)	7 (6 – 8)	7 (5 – 10)	7 (6 – 9)	6	**5** (5 – 6)	6	6	6
z4	**6** (5 – 8)	8 (6 – 10)	8 (7 – 8)	7 (5 – 8)	6 (5 – 9)	6	**6** (5 – 6)	5	7	6
z5	**4** (3 – 4)	5 (3 – 6)	4 (3 – 4)	5 (4 – 7)	4 (3 – 5)	3	**5**	5	3 – 4	3
Z1	**5** (4 – 6)	7 (5 – 8)	6 (6 – 7)	7 (5 – 8)	6 (5 – 7)	5	**5**	6	5 – 6	5
Z4	**106** (100 – 113)	108 (94 – 125)	108 (100 – 115)	108 (105 – 113)	107 (86 – 116)	115	**80** (75 – 83)	86	82 – 90	78
Z5	**221** (203 – 233)	250 (221 – 272)	235 (227 – 246)	233 (225 – 238)	231 (212 – 240)	250	**151** (143 – 158)	164	172	158
st1-st1	**60** (55 – 63)	-	-	-	-	-	**51** (50 – 53)	-	-	-
st2-st2	**68** (65 – 70)	72 (67 – 77)	69 (67 – 72)	71 (70 – 73)	70 (67 – 75)	-	**57** (55 – 58)	-	-	-
st3-st3	**76** (70 – 80)	-	-	-	-	-	**55** (53 – 58)	-	-	-
st1-st3 ♀ / *st1-st5* ♂	**60** (58 – 63)	63 (59 – 66)	60 (58 – 63)	60 (58 – 63)	60 (58 – 65)	-	**106** 100(	-	-	-
st4-st4	**77** (68 – 88)	-	-	-	-	-	**46** (43 – 110)	-	-	-
st5-st5	**73** (70 – 78)	73 (69 – 77)	73 (70 – 77)	71 (75 – 78)	74 (69 – 80)	-	**38** (38 – 48)	-	-	-
Lisl	**19** (18 – 20)	-	-	-	-	-				
Lisw	**7** (5 – 8)	-	-	-	-	-	Not applicable			
Sisl	**10**	-	-	-	-	-				
Vsl	**111** (100 – 115)	122 (110 – 136)	113 (108 – 118)	110 (100 – 118)	**117** (110 – 125)	120	**107** (100 – 113)	109	108 – 118	112
Vsw *ZV2*	**92** (85 – 100)	90 (75 – 101)	95 (89 – 99)	94 (90 – 100)	89 (79 – 100)	100	**140** (130 – 150)	145	137 – 150	135
Vsw *anus*	**82** (75 – 88)	84 (69 – 102)	85 (80 – 87)	87 (83 – 90)	-	-	**75** (63 – 90)	-	-	-
JV5	**83** (70 – 93)	-	-	-	-	84	**41** (38 – 43)	-	-	-
SgeI	**41** (39 – 43)	39 (39 – 40)	40 (37 – 42)	38 (35 – 40)	39 (37 – 44)	41	**31** (30 – 33)	30	31 – 32	30
SgeII	**39** (38 – 40)	38 (35 – 42)	39 (35 – 41)	37 (35 – 38)	36 (34 – 38)	39	**26** (20 – 28)	28	30 – 31	30
SgeIII	**55** (53 – 58)	58 (48 – 70)	57 (55 – 61)	54 (53 – 58)	55 (50 – 60)	61	**37** (35 – 40)	41	38	37
StiIII	**45** (43 – 48)	46 (34 – 53)	47 (46 – 47)	44 (43 – 45)	46 (42 – 48)	41	**30** (28 – 35)	31	33 – 34	34
SgeIV	**102** (100 – 103)	106 (85 – 126)	103 (100 – 105)	103 (97 – 115)	106 (100 – 120)	120	**63** (60 – 65)	62	67	68
StiIV	**73** (69 – 78)	69 (54 – 86)	77 (68 – 80)	69 (63 – 73)	72 (65 – 77)	75	**44** (40 – 48)	39	47 – 50	50
StIV	**69** (68 – 70)	71 (58 – 86)	71 (70 – 72)	58 (63 – 75)	66 (62 – 70)	73	**55** (53 – 60)	51	55 – 56	55
Scl	**17** (13 – 23)	23 (18 – 32)	17 (16 – 18)	14 (12 – 15)	12 (9 – 15)	30				
Scw	-	-	-	-	-	4	Not applicable			
Fdl	**34** (30 – 38)	34 (34 – 35)	30 (27 – 32)	-	31 (29 – 35)	35	**24** (23 – 25)	-	-	20
Nb teeth Fd	**11**	13	-	-	-	14	**6**	-	-	-
Mdl	**37** (28 – 38)	39 (39 – 40)	37 (36 – 38)	-	38 (35 – 41)	35	**22** (20 – 25)	-	-	23
Nb teeth Md	**3**	3	-	-	-	3	**1**	-	-	-
Shaft	Not applicable						**28** (25 – 30)	17	17	16

Sources of measurements – For ♀♀: Africa (Benin 2 ♀♀, Burundi 1♀, Cameroon 2♀♀, DR Congo 1♀, Ghana 2♀♀, Rwanda 1♀, Uganda 1♀): Zannou *et al.* (2007); Brazil (Bahia): Souza *et al.* (2015); Dominican Republic: Abo-Shnaf *et al.* (2016); Holotype Madagascar: Blommers (1974a); Thailand: Oliveira *et al.* (2012). For ♂♂: Ghana: Zannou *et al.* (2007); Brazil (Bahia): Souza *et al.* (2015); Thailand: Oliveira *et al.* (2012). - : not provided.

macrosetae. As the spermathecal of that species has a short calyx, cup-shaped, it belongs to the *asetus* species subgroup (Chant and McMurtry 2005a).

This species is known from all islands of French West Indies (Kreiter and Moraes 1997; Moraes *et al.* 2000, Kreiter *et al.* 2006; Mailloux *et al.* 2010; Kreiter *et al.* 2018c) but it was found only in very large number during a previous study on companion plant in Guadeloupe (Mailloux *et al.* 2010) and in an actual study in La Réunion (Le Bellec, unpub. data). This species seems to be very abundant on weeds in the lower vegetation. Phytoseiid mites of the genus *Proprioseiopsis* have been found mainly in ground surface, humus, litter, soil, moss or on grass (Muma and Denmark 1970; McMurtry *et al.* 2015).

Proprioseiopsis mexicanus population increase when fed *T. urticae* eggs (Megevand *et al.* 1993) and this species seems to be a good predator of thrips (Kreiter, unpub. data). It is one of the prevailing phytoseiid species on citrus orchards in Alabama (Fadamiro *et al.* 2009). Denmark and Evans (2011) mentioned that the species can be reared on *T. urticae* and *Oligonychus pratensis* (Banks) and is associated with *Bryobia praetiosa* Koch, *Bryobia* sp. and *P. ulmi*. It was also found in association with *Tetranychus evansi* Baker and Pritchard (Furtado *et al.* 2014) but mentioned as a poor predator of that species. The biology of this species is however almost unknown.

Proprioseiopsis mexicanus was already recorded by Quilici *et al.*(2000) and all details of collections were provided but measurements of specimens collected and identified were not published. Measurements of specimens collected during this study are provided in table 23.

Specimens examined: 194 ♀♀ + + 2 ♂♂ + 9 im. in total, 13 ♀♀ + 1 ♂ measured (1 ♂ in bad shape). Petite Île – Les bas, Doris Morel farm (aasl 230 m, Long 55°34'1" E, Lat 21°21'22" S), 1 ♀ on *C. farinosus*, 12/12/2015; Montvert-les-Hauts – EARL Le Mont Vert farm (aasl 582 m, Long 55°32'19" E, Lat 21°19'42" S), 4 ♀♀ on *Lobularia maritima* (L.) Desv., 14/12/2015, 16 ♀♀ on *Capsicum annuum* L., 19/5/2015, 10 ♀♀ on *C. annuum,* 4/8/2015, 21 ♀♀ on *C. annuum*, 23/08/2016, 8 ♀♀ on *C. annuum*, 15/12/2016, 13 ♀♀ on *C. annuum*, 11/1/2017, and 5 ♀♀ *C. annuum*, 11/6/2017; Saint-Pierre – Armeflor Station (aasl 450 m, Long 55°31'9" E, Lat 21°18'14" S), 1 ♀ on *Cosmos sulphureus* Cav., 15/12/2015; Saint-Paul – Savannah (aasl 61 m, Long 55°29'43" E, Lat 21°20'41" S), 2 ♀♀ on *C. annuum*, 22/9/2016; Vincendo – Delaunay Jean-Max, Jacques Payet farm (aasl 110 m, Long 55°67'14" E, Lat 21°38" S), 10 ♀♀ + 2 ♂♂ on *C. annuum*, 15/12/2016; Petite Île – Les Bas, Doris Morel farm (aasl 230 m, Long 55°34'1" E, Lat 21°21'22" S), 1 ♀ on *S. nodiflora,* 31/5/2016; 5 ♀♀ + 1 im. on *P. lanceolata,* 2 ♀♀ on *C. dactylon*, and 1 ♀ on *S. nodiflora,* 1/12/2016; 8 ♀♀ on *M. coromandelianum*, 10/1/2017; Petite Île – Piton Bloc, Yébo Luguy farm (aasl 973 m, Long 55°34'6" E, Lat 21°18'64" S), 1 ♀ on *A. conyzoides*, 5 ♀♀ on *R. raphanistrum*, 3 ♀♀ on *Ipomoea indica* (Burm.) Merr., 1 ♀ on *P. lanceolata*, 1 ♀ on *Veronica persica* Poir., 28/4/2016; 1 ♀ on *B. catharticus*, 10 ♀♀ + 1 im. on *P. lanceolata*, 9 ♀♀ + 1 im. on *R. raphanistrum*, 18/10/2016; 14 ♀♀ + 2 im. on *Citrus* sp., 6 ♀♀ + 2 im. on *S. mauritianum*, 29/11/2016, 4 ♀♀ + 3 im. on *L. camara*, 5 ♀♀ on *A. dealbata*, 5 ♀♀ on *P. aquilinum*, 9/1/2017; Le Tampon – Grand Tampon, Janick Bénard farm (aasl 861 m, Long 55°32'90" E, Lat 21°12'80" S), 1 ♀ on *P. lanceolata*, 1 ♀ on *A. conyzoides*, 1 ♀ on *Poa* sp., 2 ♀♀ on *B. pilosa*, and 4 ♀♀ on *R. raphanistrum*, 24/5/2016; Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 3 ♀♀ + 1 im. on *A. hispidum*, 17/2/2017; 2 ♀♀ on *Datura innoxia* Mill., 1 ♀ on *Sorghum arundinaceum* (Desv.) Stapf, 27/2/2017; 1 ♀ on *P. hysterophorus*, 30/3/2017; 5 ♀♀ in plot CC, 6/4/2017.

Remarks: measurement values of female and male specimens from La Réunion (Table 23) fit well with all those indicated in Kreiter *et al.*(2018c) for various countries. All setae and dimensions of specimens of this study have however slightly longer in females and males compared to specimens from other countries.

Proprioseiopsis ovatus (Garman)

Amblyseiopsis ovatus Garman 1958: 78.
Amblyseiulus ovatus, Muma 1961: 278.

Typhlodromus (*Amblyseius*) *ovatus*, Chant 1959: 90.
Typhlodromus ovatus, Hirschmann 1962: 19.
Proprioseiopsis (*Proprioseiopsis*) *ovatus*, Karg 1989: 208.
Proprioseiopsis ovatus, Moraes *et al.* 1986: 121; 2004a: 184; Chant & McMurtry 2005a: 15; 2007: 89.
Proprioseiopsis antonelli Congdon (Synonymy according to Denmark & Evans (2011).

Table 23 Character measurements of adult females and one adult male of *Proprioseiopsis mexicanus* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	♀							♂			
	La Réunion	**Africa**	**Brazil**	**Guadeloupe**	**Madagascar**	**Martinique**	**Holotype Mexico**	**La Réunion**	**Guadeloupe**	**Martinique**	**Peru**
	15, this study	3	2	5	?	12	1	1, this study	1	3	1
Dsl	**357** (325 – 368)	340 (336 – 344)	325 – 350	335 (331 – 339)	340	337 (312 – 369)	355	**268**	279	243-253	288
Dsw	**232** (213 – 240)	223 (214 – 230)	195 – 215	224 (212 – 241)	230	205 (186 – 257)	216	**185**	194	153-164	193
j1	**24** (23 – 28)	17 (16 – 18)	21 – 22	19 (15 – 22)	20	22 (19 – 24)	22	**15**	17	18	20
j3	**31** (28 – 33)	28 (26 – 29)	30 – 31	30 (24 – 34)	27	30 (28 – 31)	28	**28**	24	24 – 27	35
j4	**5** (5 – 8)	5 (5 – 6)	5	5 (4 – 7)	3	5 (3 – 6)	6	**5**	5	4	5
j5	**4** (3 – 5)	4 (3 – 5)	5	5 (4 – 7)	4	5 (4 – 6)	5	**6**	4	4	5
j6	**5** (3 – 8)	6 (5 – 6)	6	5 (5 – 6)	4	6 (5 – 7)	7	**8**	5	5	8
J5	**9** (8 – 10)	9 (8 – 10)	9 – 10	9 (9 – 10)	7	10 (6 – 14)	7	**9**	9	8 – 9	8
r3	**14** (13 – 15)	15 (14 – 16)	14 – 16	11 (9 – 14)	12	13 (13 – 16)	13	**13**	10	11 – 13	18
R1	**10** (8 – 13)	8 (6 – 10)	10 – 11	9 (8 – 10)	12	9 (7 – 10)	7	**10**	8	7 – 9	10
s4	**63** (58 – 68)	54 (53 – 56)	49 – 52	59 (56 – 65)	54	63 (53 – 68)	56	**48**	43	45 – 46	50
S2	**9** (8 – 10)	9 (8 – 10)	8 – 9	9 (8 – 10)	9	9 (8 – 10)	8	**12**	9	5 – 9	7
S4	**9** (8 – 10)	9 (8 – 10)	10	9 (8 – 10)	9	9 (8 – 10)	8	**10**	9	9	10
S5	**10** (8 – 10)	10 (10 – 11)	10	9 (9 – 12)	9	10 (8 – 11)	8	**12**	9	10	10
z2	**16** (13 – 18)	12 (8 – 16)	12	12 (11 – 14)	13	14 (13 – 15)	14	**15**	11	10 – 12	18
z4	**11** (8 – 13)	9 (8 – 11)	11 – 12	10	9	10 (8 – 11)	10	**13**	11	9 – 10	18
z5	**4** (3 – 5)	4 (3 – 5)	4	4 (4 – 5)	4	5 (4 – 5)	5	**5**	10	4	5
Z1	**8** (8 – 10)	8	9	6 (5 – 7)	9	7 (6 – 8)	6	**5**	8	6	5
Z4	**79** (75 – 83)	69 62 – 74)	64 – 70	74 (72 – 76)	60	78 (66 – 83)	73	**55**	56	50 – 60 ser.	68
Z5	**110** (103 – 120)	102 (94 – 112)	85 – 93	103 (97 – 110)	104	108 (95 – 131)	98	**75**	74	78 ser.	89
st1-st1	**54** (53 – 58)	-	-	-	-	49 (45 – 52)		**50**	-	42 – 43	-
st2-st2	**65** (63 – 68)	64	64 – 65	68 (65 – 74)	-	61 (57 – 64)		**55**	-	51	-
st3-st3	**74** (73 – 80)	-	-	-	-	69 (62 – 71)		**55**	-	49 – 50	-
st1-st3 ♀ / *st1-st5* ♂	**64** (63 – 75)	60 (59 – 61)	57 – 60	60 (58 – 62)	-	58 (55 – 62)		**105**	-	87 – 92	-
st4-st4	**72** (68 – 75)	-	-	-	-	70 (64 – 74)		**38**	-	53 – 57	-
st5-st5	**69** (63 – 73)	65 (61 – 69)	65 – 70	66 (64 – 72)	-	62 (58 – 69)		**33**	-	28 – 36	-
Lisl	**27** (23 – 30)	-	-	-	-	23 (21 – 26)					
Lisw	**5** (5 – 5)	-	-	-	-	6 (5 – 7)			Not applicable		
Sisl	**11** (8 – 15)	-	-	-	-	12 (10 – 16)					
Vsl	**116** (100 – 125)	113 (109 – 115)	102 – 108	108 (103 – 114)	115	102 (95 – 120)	112	**108**	103	104 – 110	127
Vsw *ZV2*	**86** (78 – 90)	97 (81 – 101)	92 – 95	92 (86 – 97)	90	91 (83 – 100)	96	**133**	121	101 – 118	144
Vsw *anus*	**66** (60 – 73)	77 (72 – 80)	80	85 (80 – 89)	-	75 (68 – 81)		**63**	-	72	-
JV5	**71** (60 – 78)	-	60 – 65	-	62	68 (62 – 76)		**28**	-	22 – 33	-
SgeII	**24** (23 – 28)	23 (22 – 24)	21 – 22	23 (20 – 24)	20	23 (21 – 24)	25	**16**	-	15	25
SgeIII	**24** (23 – 25)	23 (22 – 24)	23	24 (23 – 25)	20	26 (21 – 28)	25	**19**	19	18	23
SgeIV	**50** (43 – 55)	49 (45 – 51)	45	49 (48 – 51)	48	52 (46 – 55)	54	**33**	32	33 – 34	38
StiIV	**31** (23 – 35)	27	26	32 (27 – 36)	30	32 (25 – 35)	32	**19**	23	19 – 22	21
StIV	**61** (55 – 63)	58	55	56 (51 – 60)	61	59 (53 – 67)	62	**45**	48	49 – 53	51
Scl	**6** (4 – 8)	3 (3 – 4)	-	-	-	-					
Scw	**10** (9 – 13)	9 (9 – 10)	-	-	10	-			Not applicable		
Fdl	**31** (30 – 33)	29 (28 – 29)	29	33 (29 – 38)	28	29 (27 – 32)		**23**	-	20	-
No teeth Fd	**8 + 2**	8	8	-	8	9		-	-	4	-
Mdl	**31** (30 – 33)	34 (33 – 34)	31	31 (29 – 32)	28	33 (31 – 34)		**23**	-	22	-
No teeth Md	**1**	1	1	-	1	1		-	-	1	-
Shaft	Not applicable							**23**	18	15	-

Sources of measurements – For ♀♀: Africa: Moraes *et al.* (2007a); Brazil: Lofego *et al.* (2009); Guadeloupe: Kreiter & Moraes (1997); Madagascar (identified as *Amblyseius tulearensis* , synonymized by Denmark & Evans 2011): Blommers (1976); Martinique: Kreiter *et al* . (2018c); Holotype Mexico: Moraes *et al.* (2007). For ♂♂: Guadeloupe: Kreiter & Moraes (1997); Martinique: Kreiter *et al.* (2018c); Peru: Guanilo *et al.* (2008a). - : not provided.

Proprioseiopsis cannaensis (Muma) (Synonymy according to Denmark & Evans (2011). *Proprioseiopsis hundsonianus* (Chant & Hansell) — (Synonymy according to Denmark & Evans (2011); *Proprioseiopsis parapeltatus* (synonymy according to Tseng 1983). *Proprioseiopsis peltatus* (van der Merwe) (synonymy according to Tseng 1983).

Like *P. mexicanus*, *P. ovatus* belongs to the *belizensis* species (see above). As the spermatheca of that species is saccular, it belongs to the *belizensis* species subgroup (Chant and McMurtry 2005a).

This species is known from Guadeloupe, Marie-Galante and Martinique (Kreiter and Moraes 1997; Moraes *et al.* 2000; Mailloux *et al.* 2010; Kreiter *et al.* 2018c). This species was found in very large number only during a previous study on companion plant in Guadeloupe (Mailloux *et al.* 2010) and in a recent study in La Réunion (Le Bellec, unpub. data). In other habitats, this species seems to be rare. This species like *P. mexicanus* seems to be abundant on weeds in the lower vegetation. Denmark and Evans (2011) indicated that this species is associated with *O. pratensis* and *Brevipalpus* sp. It was also found in association with *T. evansi* (Furtado *et al.* 2014) but mentioned as poor predator of that species. Despite this information, the biology of this species remains unknown.

This is the first mention of this species from La Réunion.

Specimens examined: 58 ♀♀ in total, 12 ♀♀ measured. Petite Île – Piton Bloc, Yébo Luguy farm (aasl 973 m, Long 55°34'64" E, Lat 21°18'64" S), 1 ♀ on *R. raphanistrum*, 26/11/2015; 1 ♀ on *P. lanceolata,* 9/12/2015; 1 ♀ on *A. conyzoides,* 4 ♀♀ on *R. raphanistrum,* 1♀ on *I. indica*, 28/4/2016; 4 ♀♀ on *R. raphanistrum,* 1 ♀ on *B. pilosa,* 2 ♀♀ on *Citrus lemon* Eureka, 24/5/2016; Le Tampon – Grand Tampon, Janick Bénard farm (aasl 1100 m, Long 55°34'12" E, Lat 21°16'48" S), 1 ♀ on *L. camara*, 9/12/2015; Saint-Gilles – Pépinières du Théâtre (aasl 70 m, Long 56°13'58" E, Lat 21°2'50" S), 1 ♀ on *Ipomoea nil* (L.) Roth, 14/2/2017; Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 40 ♀♀ in plot CC, 1 in plot F, 1 ♀ in plot H, 6/4/2017.

Remarks: measurements of female specimens of La Réunion (Table 24) fit well those obtained for populations of various countries. Despite the great number of females sampled, no male was recorded.

Tribe Euseiini Chant & McMurtry

Euseiini Chant & McMurtry 2005b: 191.

Sub-tribe Typhlodromalina Chant & McMurtry

Typhlodromalina Chant & McMurtry 2005b: 195.

Genus *Typhlodromalus* Muma

Amblyseius (*Typhlodromalus*) Muma, 1961: 288; *Typhlodromalus*, De Leon 1966: 87.

Typhlodromalus spinosus (Meyer & Rodrigues)

Amblyseius spinosus Meyer & Rodrigues 1966: 30.
Kampimodromus spinosus, Quilici *et al.* 2000: 100.
Typhlodromalus spinosus, Moraes *et al.* 186: 2004a: 204.
Typhlodromalus spinosus, Chant & McMurtry 2005a: 199; 2007: 111.

Typhlodromalus spinosus belongs to the *athiasae* species group as setae *J1* and *S5* are absent. This species group contains six species (Chant and McMurtry 2005b, Moraes *et al.* 2006).

Typhlodromalus spinosus was collected in eastern, western but mainly southern Africa and in La Réunion (Demite *et al.* 2019). The rapid multiplication of this species on the western flower thrips (WFT), *F. occidentalis*, was confirmed and clear evidence that *T. spinosus*

Table 24 Character measurements of adult females of *Proprioseiopsis ovatus* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	La Réunion	Africa	Madagascar	South Africa	Sri Lanka	Thailand	Holotype USA
	12, this study	10	?	3	1	8	1
Dsl	**361** (328 – 400)	348 (324 – 381)	320	358 – 362	357	329 (320- 337)	372
Dsw	**290** (253 – 330)	270 (227 – 290)	230	294 – 313	292	268 (225 – 315)	252
j1	**31** (30 – 35)	29 (28 – 32)	32	28 – 30	27	26 (24 – 29)	28
j3	**66** (57 – 75)	64 (57 – 69)	61	66	61	64 (60 – 68)	64
j4	**5** (5 – 8)	6 (4 – 8)	-	6	5	6 (5 – 8)	8
j5	**5** (4 – 8)	6 (5 – 8)	-	6	-	5 (5 – 6)	8
j6	**10** (8 – 13)	9 (8 – 10)	-	9 – 13	8	11	12
J5	**8** (8 -10)	8 (6 – 10)	-	9 – 13	9	8 (6 – 9)	8
r3	**20** (15 – 25)	19 (16 – 21)	-	20	20	21 (17 – 25)	22
R1	**13** (10 -15)	10 (9 – 11)	-	10	11	10 (10 – 11)	17
s4	**103** (93 – 108)	99 (91 – 106)	100	105 – 110	96	100 (98 – 100)	88
S2	**21** (18 – 25)	20 (14 – 26)	21	19 – 21	22	21 (14 – 25)	17
S4	**13** (10 – 17)	14 (9 – 16)	-	9 – 13	13	16 (12 – 18)	16
S5	**12** (10 – 15)	10 (9 – 11)	-	9 – 13	11	12 (10 – 15)	12
z2	**42** (35 – 53)	39 (32 – 44)	30	43 – 45	45	34 (31 – 36)	42
z4	**26** (18 – 36)	25 (19 – 34)	25	28 – 30	24	22 (20 – 27)	22
z5	**5** (5 – 6)	6 (5 – 8)	-	6	5	5 (4 – 6)	8
Z1	**24** (23 – 25)	21 (14 – 24)	-	19 – 21	20	21 (18 – 25)	17
Z4	**107** (103 – 118)	108 (88 – 120)	100	122	107	109 (105 – 115)	101
Z5	**95** (90 – 103)	88 (67 – 107)	110	105 – 110	96	92 (83 – 96)	90
St1-St1	**54** (49 – 60)	-	-	-	-	-	-
St2-St2	**76** (70 – 80)	70 (63 – 77)	-	-	70	73 (70 – 77)	-
St3-St3	**93** (85 – 98)	-	-	82 (78 – 84)	-	-	-
St1-St3	**60** (55 – 63)	53 (50 – 56)	-	48 – 52	47	54 (52 – 55)	-
St4-St4	**91** (83 – 98)	-	-	-	-	-	-
St5-St5	**95** (88 – 103)	89 (82 – 96)	102	111 – 115	93	92 (90 – 97)	-
Lisl	**30** (25 – 33)	-	-	-	-	-	-
Lsiw	**5** (4 – 5)	-	-	-	-	-	-
Sisl	**10**	-	-	-	-	-	-
Vsl	**114** (103 – 133)	109 (98 – 122)	93	110 – 115	115	106 (100 – 115)	-
vsw *ZV2*	**97** (75 – 115)	108 (104 – 115)	102	110 – 115	113	112 (109 – 115)	-
vsw *anus*	**87** (75 – 95)	90 (84 – 104)	-	-	90		-
JV5	**85** (75 – 95)	-	77	89 – 93	-	78	-
SgeIII	**27** (22 – 31)	28 (25 – 32)	32	33	25	27 (24 – 29)	-
StiIII	**22** (20 – 25)	-	-	-	-	24 (22 – 26)	-
SgeIV	**61** (55 – 65)	58 (46 – 66)	50	66	50	55 (45 – 61)	55
StiIV	**40** (35 – 45)	41 (34 – 47)	36	45	37	37 (35 – 40)	43
StIV	**87** (73 – 105)	84 (77 – 91)	86	90	79	88 (83 – 90)	96
Scl	**22** (18 – 23)	16 (13 – 19)	-	24	18	14 (12 – 17)	22
Scw	**9** (8 – 10)	-	-	10	-	-	-
Fdl	**32** (25 – 35)	30 (28 – 32)	-	33	32	30 (29 – 31)	-
No teeth Fd	**6 – 7**	5	-	5	6 – 7	-	-
Mdl	**32** (30 – 35)	33 (32 – 34)	-	35	30	31 (29 – 34)	-
No teeth Md	**1**	1	-	1	1	-	-

Sources of measurements – Africa (Ghana 4♀, Kenya 2♀, Sierra-Leone 1♀, Zimbabwe 1♀, South Africa 2♀): Moraes *et al.* (2007a); Madagascar (identified as *Amblyseius peltatus* , synonymized by Tseng 1983): Blommers (1976); Martinique: Kreiter *et al.* (2018c); South Africa (identified as *Amblyseius peltatus* , synonymized by Tseng 1983): van der Merwe (1968); Thailand: Oliveira *et al.* (2012); Sri Lanka: Moraes *et al.* (2004a); Holotype USA: Moraes & McMurtry (1983); - : not provided.

predates on WFT under laboratory and field conditions but not on *T. urticae* was established (Mwangi *et al.* 2015). This species seems abundant in low vegetation as it was found in high populations in a study of companion plants in citrus orchard (Le Bellec *et al.* unpub. data). This species have never been record in Guadeloupe or Martinique in similar studies but it is interesting to notice that in those islands, another *Typhlodromalus* was collected, *T. peregrinus* (Muma) (Mailloux *et al.* 2010; Kreiter *et al.* 2013, 2018c). *T. spinosus* was already recorded by Quilici *et al.*(2000) and all details of collections were provided but measurements of specimens collected and identified were not published. Measurements of specimens collected during this study are provided in table 25.

Specimens examined: 113 ♀♀ + 18 ♂♂ + 10 im. in total, 13 ♀♀ + 4 ♂♂ measured. Petite Île – Piton Bloc, Yébo Luguy farm (aasl 973 m, Long 55°34'64" E, Lat 21°18'64" S), 1 ♀ on *B. catharticus*, 18/10/2016; 1 ♀ on *P. lanceolata,* 9/12/2015; 1 ♀ on *A. conyzoides,* 4 ♀♀ on *R. raphanistrum,* 1♀ on *I. indica*, 28/4/2016; 4 ♀♀ on *R. raphanistrum,* 1 ♀ on *B. pilosa,* 2 ♀♀ on *C. limon,* 24/5/2016; Le Tampon – Grand Tampon, Janick Bénard farm (aasl 1100 m, Long 55°34'12" E, Lat 21°16'48" S), 2 ♀♀ on *P. americana,* 1 ♂ on *R. alceifolius*, 7/1/2016; 3 ♀♀ + 1 ♂ on *R. raphanistrum*, 11 ♀♀ + 3 ♂♂ on *B. pilosa*, 12 ♀♀ on *A. conyzoides*, 24/5/2016; 6 ♀♀ on *B. pilosa* 16/9/2016; 41 ♀♀ + 8 ♂♂ + 6 im. on *B. pilosa*, 5 ♀♀ + 3 ♂♂ on *P. lanceolata,* 14 ♀♀ + 3 im. on *R. raphanistrum*, 2 ♀♀ + 1 ♂ on *Trifolium repens* L., 1 ♀ on *Sonchus asper* All., 1 ♂♂ + 1 im. on *B. catharticus,* 20/9/2016; Le Tampon – Bras de Pontho, Aldo Grace farm (aasl 661 m, Long 55°29'48" E, Lat 21°14'33" S), 1 ♀ on *A. viridis*, 21/2/2017.

Remarks: measurements of female and male specimens of La Réunion (Table 25) fit well those obtained for populations of various countries. Measurements are in general for all characters longer compared to those obtained on specimens of other countries in general.

Genus *Ueckermannseius* Chant & McMurtry

Ueckermannia Chant & McMurtry, 2005b: 201. Preoccupied by *Ueckermannia* Kazmierski, 1996 (Tydeidae).
Ueckermannseius Chant & McMurtry, 2005c: 337; 2007: 115.

Ueckermannseius nesiotus (Ueckermann & Kreiter)

Typhlodromalus nesiotus Ueckermann & Kreiter 2002: 343.
Ueckermannseius nesiotus Chant & McMurtry, 2005b: 203; 2007: 115.

This species was described as *Typhlodromalus nesiotus* Ueckermann and Kreiter in Kreiter *et al.*(2002) but as all setae are short to minute, the setae *Z4* are not as long as distance between their base and that of setae *S4* and the dorsal shield is smooth except some anterolateral striations, it belongs to the genus *Ueckermannseius* (Chant and McMurtry 2005b). This species has never been recorded from other countries or record again in La Réunion since its description. The biology of this species remains totally unknown.

This is the first new record since the original description in 2002.

Specimens examined: two ♀♀ in total, both measured. Petite Île – Piton Bloc, Yébo Luguy farm (aasl 973 m, Long 55°34'64" E, Lat 21°18'64" S), 1 ♀ on *R. raphanistrum*, 9/12/2015; Forêt de Sans Souci – Ilet Alcide, (aasl 1452 m, Long 55°22'07" E, Lat 21°01'17" S), 1 ♀ on *Hypericum lanceolatum* Lam., 18/11/2018.

Remarks: the two females collected and measured during this study (Table 26) slightly differ from females measured by Kreiter *et al.*(2002). Dorsal shield dimensions are greater by 15–26%, length and width of the sternal shield are greater by 25 and 20% respectively, and the length of *JV5* is greater by 60%.

Ueckermannseius parahavu Moraes, Zannou & Oliveira

Ueckermannseius parahavu Moraes, Zannou & Oliveira, in Moraes *et al.* 2006: 36, Chant & Mcurtry 2007: 115.

Table 25 Character measurements of adult females and males of *Typhlodromalus spinosus* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	♀				♂		
	La Réunion	**Africa**	**Kenya**	**Mozambique**	**La Réunion**	**Kenya**	**Mozambique**
	13, this study	6	9	10	4, this study	1	3
Dsl	**339** (320 – 355)	332 (322 – 344)	330	327 – 350	**260** (248 – 268)	246	260
Dsw	**200** (190 – 222)	202 (192 – 210)	195	205 – 233	**178** (168 – 188)	152	176
j1	**35** (30 – 38)	29 (26 – 33)	28	32 – 37	**25** (23 – 28)	19	19 – 20
j3	**42** (40 – 45)	33 (29 – 38)	35	38 – 45	**30** (28 – 35)	22	27 – 31
j4	**19** (15 – 23)	15 (14 – 16)	16	16 – 24	**15** (13 – 18)	11	12 – 13
j5	**19** (16 – 23)	16 (14 – 18)	18	16 – 22	**14** (13 – 15)	13	12 – 15
j6	**28** (25 – 33)	22 (19 – 25)	21	22 – 30	**22** (21 – 23)	14	14 – 19
J2	**29** (28 – 33)	24 (21 – 25)	23	22 – 33	**16** (15 – 16)	14	15 – 16
J5	**9** (5 – 10)	9 (8 – 10)	9	9 – 13	**5** (5 – 6)	5	9 – 10
r3	**23** (20 – 26)	18 (16 – 23)	28	-	**17** (15 – 20)	13	-
R1	**20** (18 – 23)	18 (14 – 21)	22	-	**12** (10 – 13)	13	-
s4	**54** (43 – 63)	47 (43 – 53)	48	47 – 63	**42** (40 – 45)	34	35 – 39
S2	**51** (45 – 55)	42 (37 – 48)	44	45 – 56	**29** (28 – 30)	24	26 – 27
S4	**43** (38 – 53)	30 (22 – 38)	35	Absent	**21** (15 – 28)	16	Absent
z2	**27** (23 – 33)	22 (21 – 24)	25	22 – 32	**16** (15 – 18)	16	17 – 22
z4	**39** (35 – 45)	34 (30 – 40)	39	33 – 47	**28** (28 – 30)	26	23 – 27
z5	**18** (18 – 20)	16 (14 – 18)	22	16 – 22	**13** (13 – 15)	13	13 – 15
Z1	**27** (25 – 30)	23 (19 – 26)	26	22 – 29	**16** (15 – 18)	16	14 – 16
Z4	**52** (48 – 60)	48 (43 – 50)	50	53 – 63	**37** (35 – 40)	30	32 – 38
Z5	**70** (68 – 80)	65 (61 – 68)	74	67 – 83	**46** (43 – 48)	40	39 – 47
st1-st1	**60** (58 – 63)	-	-	-	**48** (46 – 50)	-	-
st2-st2	**80** (73 – 83)	65 (62 – 69)	60	72 – 76	**57** (55 – 58)	-	-
st3-st3	**69** (58 – 83)	-	-	-	**64** (55 – 83)	-	-
st1-st3 ♀ / *st1-st5* ♂	**64** (60 – 68)	64 (61 – 68)	60	83 – 84	**108** (105 – 113)	-	-
st4-st4	**99** (75 – 120)	-	-	-	**49** (45 – 50)	-	-
st5-st5	**76** (73 – 81)	71 (67 – 78)	83	76 – 85	**38** (35 – 40)	-	-
Lisl	**21** (18 – 25)	-	-	-			
Lisw	**5**	-	-	-	Not applicable		
Sisl	**9** (8 – 10)	-	-	-			
Vsl	**112** (105 – 133)	103 (99 – 109)	100	97 – 117	**105** (98 – 118)	91	-
Vsw *ZV2*	**54** (48 – 62)	51 (43 – 55)	55	62 – 74	**131** (108 – 148)	136	-
Vsw *anus*	**66** (58 – 73)	62 (58 – 70)		-	**89** (83 – 93)	-	-
JV5	**61** (53 – 69)	-	58	58 – 72	**24** (23 – 25)	-	21 – 24
SgeI	**21** (19 – 28)	16 (13 – 20)		20 – 23	**17** (17 – 18)	14	-
SgeII	**24** (23 – 25)	19 (14 – 23)	18	26 – 28	**18** (18 – 19)	14	16 – 19
SgeIII	**31** (29 – 33)	27 (22 – 33)	20	30 – 34	**23** (20 – 25)	19	20 – 23
StiIII	**21** (19 – 23)	20 (19 – 23)	16	-	**16**	13	-
SgeIV	**52** (48 – 55)	43 (40 – 48)	41	45 – 47	**33** (30 – 35)	29	28 – 36
StiIV	**27** (24 – 30)	26 (24 – 30)	23	-	**21** (20 – 23)	18	-
StIV	**62** (55 – 68)	55 (53 – 58)	58	62 – 72	**42** (40 – 45)	40	42 – 46
Scl	**25** (23 – 31)	16 (15 – 18)	16	24			
Scw	**12** (9 – 20)	-	-	14	Not applicable		
Fdl	**34** (30 – 38)	30 (29 – 30)	-	32 – 34	**20** (18 – 23)	-	-
No teeth Fd	**8 – 9?**	9 – 10	9	9	**6**	-	7
Mdl	**34** (28 – 43)	36 (35 – 37)	-	35 – 38	**20** (19 – 23)	-	-
No teeth Md	**3**	3 – 4	3	3	**1**	-	1
Shaft	Not applicable				**26** (23 – 30)	24	-

Sources of measurements – For ♀♀: Africa (Benin 1♀, Burundi 1♀, Kenya 3♀♀, DR Congo 1♀): Moraes *et al.* (2006); Kenya: El-Banhawy & Knapp (2011a); Mozambique: Meyer & Rodrigues (1966). For ♂♂: Kenya: Moraes *et al.* (2006); Mozambique: Meyer & Rodrigues (1966). - : not provided.

All dorsal setae of this species are short to minute, the setae *Z4* are not as long as distance between their base and that of setae *S4* and the dorsal shield is smooth except some anterolateral striations. Thus, it belongs to the genus *Ueckermannseius* (Chant and McMurtry 2005b). This species is only known from Ghana (Moraes *et al.* 2006) and nothing is known on its biology.

This is the first new record of that species in another location and the first record of the species in La Réunion.

Specimens examined: 2 ♀♀ in total, both measured. Forêt de Bélouve – Gîte (aasl 1500 m, Long 55°33'36" E, Lat 21°6'0" S), 2 ♀♀ on *C. borbonica*, 28/1/2017.

Remarks: two females have been collected and compared (Table 27) to specimens of Ghana (Moraes *et al.* 2006). Measurements of morphological characters of specimen females from La Réunion (Table 27) fit well with those of specimens of Ghana, with slightly shorter setae, especially *j3*, *s4*, *z4* and the macrosetae of the leg IV. Setae *S4* and dorsum length dimensions are however slightly greater from those of specimens of Ghana (Moraes *et al.* 2006).

Genus *Amblydromalus* Chant & McMurtry

Amblydromalus Chant & McMurtry, 2005b: 203; 2007: 117.

Amblydromalus nakuruensis Moraes, Zannou & Oliveira

Amblydromalus nakuruensis Moraes, Zannou & Oliveira 2006, in Moraes *et al.*: 6; Chant & McMurtry 2007: 117.

This species has the setae *Z4* much shorter than 40% of distance between its base and that of setae *Z5* and thus belongs to the *limonicus* species group which contains 16 species (Chant and McMurtry 2005b).

This species was only known before from Kenya (Demite *et al.* 2019) and its biology remains totally unknown.

This is the first record of that species in another country and the first record in La Réunion.

Specimens examined: A single ♀ in total, measured. Saint-Pierre – Armeflhor Station (aasl 450 m, Long 55°31'9" E, Lat 21°18'14" S), 1 ♀ on *Persea americana* Mill., 15/12/2015.

Table 26 Character measurements of adult females of *Ueckermannseius nesiotus* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	La Réunion (2) (this study)	La Réunion types 2	Characters	La Réunion (2) (this study)	La Réunion types 2	Characters	La Réunion (2) (this study)	La Réunion types 2
Dsl	**343 – 375**	341 (334 – 347)	*z2*	**15**	13	Lisw	**5**	**4** (1)*
Dsw	**170 – 225**	178 (176 – 180)	*z4*	**13**	13	Sisl	**13**	**11** (1)*
j1	**20 – 23**	21 (19 – 22)	*z5*	**8 – 10**	9	Vsl	**85 – 113**	92 (85 – 98)
j3	**13 – 15**	15 (14 – 16)	*Z1*	**8 – 10**	9	Vsw *ZV2*	**58 – 63**	59 (54 – 63)
j4	**8 – 9**	9	*Z4*	**10**	10 (9 – 11)	Vsw *anus*	**60 – 63**	60 (57 – 63)
j5	**8**	9	*Z5*	**18 – 20**	19	*JV5*	**20 – 30**	19
j6	**8 – 10**	9	*st1-st1*	**50 – 58**	**50** (1)*	*SgeIV*	**20 – 25**	19
J2	**8 – 10**	10 (9 – 11)	*st2-st2*	**55 – 60**	49 (47 – 50)	*StiIV*	**20 – 25**	25
J5	**5**	7 (6 – 8)	*st3-st3*	**63 – 70**	**65** (1)*	*StIV*	**35 – 40**	37
r3	**10**	10 (9 – 11)	*st1-st3*	**73 – 75**	59 (57 – 60)	Scl	**25 – 28**	32
R1	**10 – 13**	10 (9 – 11)	*st4-st4*	**68 – 73**	**70** (1)*	Scw	**4**	**4** (1)*
s4	**13**	13	Gensl	**100 – 123**	**115***	Fdl	**25 – 33**	32
S2	**13**	10 (9 – 11)	Gensw *st5*	**68 – 75**	**70***	No teeth Fd	**7 – 8?**	10 – 11?
S4	**13**	9	Gensw post. corn.	**70 – 73**	**80***	Mdl	**25 – 30**	28
S5	**10**	9	*st5-st5*	**55 – 63**	61 (59 – 62)	No teeth Md	**2 – 3?**	3?
			Lisl	**20**	**20** (1)			

Sources of measurements – La Réunion types: Kreiter *et al.* (2002b); *New measurements on one paratype female.

Remarks: measurements of morphological characters of the single female found in La Réunion (Table 28) are 6–50% smaller than those obtained on specimen from Kenya, especially *j1*, *j6*, *J2*, *s4*, *S2*, *z2*, *z4*, *Z5* and length of chelicerae. Measurements were however taken on a single specimen from each country, and so this data must be compared with caution.

Subtribe Euseiina Chant & McMurtry

Euseiina Chant & McMurtry, 2005b: 209.

Table 27 Character measurements of adult females of *Ueckermannseius pahavu* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	La Réunion 2, this study	Ghana 11	Characters	La Réunion 2, this study	Ghana 11	Characters	La Réunion 2, this study	Ghana 11
Dsl	**389** (375 – 403)	356 (328 – 371)	*z2*	**18**	21 (19 – 24)	Vsl	**115** (113 – 118)	114 (96 – 128)
Dsw	**201** (163 – 240)	237 (221 – 253)	*z4*	**15**	23 (16 – 27)	Vsw *ZV2*	**70** (65 – 75)	56 (51 – 64)
j1	**29** (28 – 30)	33 (30 – 37)	*z5*	**11** (10 – 13)	13 (10 – 16)	Vsw *anus*	**72** (70 – 74)	60 (58 – 67)
j3	**20**	35 (32 – 42)	*Z1*	**14** (13 – 15)	13 (11 – 16)	*JV5*	**25**	-
j4	**11** (10 – 13)	12 (11 – 13)	*Z4*	**14** (13 – 15)	13 (10 – 14)	*SgeII*	**26** (23 – 30)	25 (22 – 27)
j5	**11** (10 – 13)	12 (10 – 14)	*Z5*	**20**	21 (18 – 26)	*SgeIII*	**28**	33 (30 – 37)
j6	**13** (13 – 13)	12 (10 – 14)	*st1-st1*	**61** (60 – 63)	-	*StiIII*	**25**	27 (26 – 29)
J2	**14** (13 – 15)	12 (11 – 14)	*st2-st2*	**59** (58 – 60)	62 (58 – 66)	*SgeIV*	**34** (33 – 35)	50 (45 – 53)
J5	**8**	8 (5 – 10)	*st3-st3*	**76** (75 – 78)	-	*StiIVI*	**32** (30 – 33)	42 (38 – 46)
r3	**16** (15 – 18)	18 (16 – 22)	*st1-st3*	**71** (70 – 73)	70 (67 – 74)	*StIV*	**52** (50 – 53)	64 (58 – 70)
R1	**14** (13 – 15)	14 (11 – 16)	*st4-st4*	**75** (75 – 75)	-	Scl	**32** (30 – 33)	32 (27 – 35)
s4	**21** (20 – 23)	30 (26 – 35)	*st5-st5*	**79** (75 – 83)	70 (64 – 78)	Scw	**5**	-
S2	**16** (15 – 18)	15 (11 – 18)	Lisl	**20** (18 – 23)	-	Fdl	**32** (30 –33)	30 (30 – 31)
S4	**18**	11 (10 – 14)	Lisw	**4** (3 – 5)	-	No teeth Fd	ssible to count. A	11
S5	**15**	12 (8 – 14)	Sisl	**10**	-	Mdl	**35**	35 (35 – 36)
						No teeth Fd	1 or 2	4

Sources of measurements – Ghana: Moraes *et al.* (2006); - : not provided.

Table 28 Character measurements of one adult female of *Amblydromalus nakuruensis* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	La Réunion 1, this study	Kenya 1	Characters	La Réunion 1, this study	Kenya 1	Characters	La Réunion 1, this study	Kenya 1
Dsl	**290**	349	*z4*	**28**	38	Vsl	**88**	114
Dsw	**158**	208	*z5*	**10**	13	Vsw *ZV2*	**55**	62
j1	**25**	34	*Z1*	**15**	18	Vsw *anus*	**55**	70
j3	**38**	43	*Z4*	**30**	27	*JV5*	**33**	-
j4	**10**	13	*Z5*	**55**	62	*SgeII*	**25**	27
j5	**10**	11	*st1-st1*	**60**	-	*SgeIII*	**25**	26
j6	**10**	16	*st2-st2*	**63**	66	*StiIII*	**23**	24
J2	**10**	16	*st3-st3*	**70**	-	*SgeIV*	**40**	43
J5	**8**	8	*st1-st3*	**58**	67	*StiIV*	**28**	26
r3	**23**	24	*st4-st4*	**-**	-	*StIV*	**53**	Broken
R1	**13**	13	*st5-st5*	**75**	85	Scl	**18**	22
s4	**50**	59	Lisl	**18**	-	Scw	**3**	-
S2	**20**	35	Lisw	**3**	-	Fdl	**30**	38
S4	**13**	16				No teeth Fd	**8 – 9**	9
S5	**20**	21				Mdl	**30**	35
z2	**18**	24				No teeth Md	**?**	4

Sources of measurements – Kenya: Moraes *et al.* (2006); - : not provided.

Genus *Euseius* Wainstein

Amblyseius (*Amblyseius*) section *Euseius*, Wainstein, 1962: 15; *Euseius* De Leon, 1967: 86.

Euseius hima (Pritchard & Baker)

Amblyseius (*Amblyseius*) *hima* Pritchard & Baker 1962: 257; Blommers 1976: 89.
Euseius hima, Moraes *et al.* 1986: 46, 2004a: 71; Quilici *et al.* 2000: 99; Chant & McMurtry 2005b: 215, 2007: 121.

This species was recorded from several countries of Sub-Saharan Africa but also from Madagascar, India (Demite *et al.* 2019) and La Réunion (Quilici *et al.* 2000; Demite *et al.* 2019). All details of collections were provided in the paper but measurements of specimens collected and identified were not published. Measurements of specimens collected during this study are provided in table 29. The biology of this species remains totally unknown.

Specimens examined: 26 ♀♀ + 4 ♂♂ + 16 im. in total, 15 ♀♀ + 4 ♂♂ measured. Le 19^{e} – Plaine des Caffres, JL Robert farm (aasl 1000 m, Long 55°32'9" E, Lat 21°14'16" S), 1 ♀ on *L. camara*, 15/12/2015; Le Tampon – Bras creux (aasl 888 m, Long 55°32'39" E, Lat 21°15'24" S), 1 ♀ on *Obetia ficifolia* Gaudich., 18/12/2015; Le Tampon – Ligne des 400 (aasl 463 m, Long 55°30'36" E, Lat 21°17'24" S), 14 ♀♀ + 1 ♂ + 8 im. on *Ipomoea* sp., 17/12/2016 and 10/1/2017; 5 ♀♀ on *Spathodea campanulata* P. Beauv., 12/1/2017; 3 ♀♀ + 1 ♂ on *Solanum wrightii* Benth., 18/1/2017; Forêt de Sans Souci – Ilet Alcide, (aasl 1452 m, Long 55°22'07" E, Lat 21°01'17" S), 1 ♂ on *C. glauca*, 1 ♂ on *A. theiformis*, 18/11/2018; Saint-Pierre – Armeflhor Station (aasl 450 m, Long 55°31'9" E, Lat 21°18'14" S), 2 ♀♀ + 5 im. on *Terminalia benzoe* Pers., 15/12/2015.

Remarks: measurements of morphological characters of females of *E. hima* fit very well with those provided in the literature (Table 29), especially with those of specimens of various countries in Africa published in Moraes *et al.*(2001).

For the males (Table 29), setae *Z5* is shorter and ventrianal shield is longer in specimens from La Réunion Island.

Sub-family Phytoseiinae Berlese

Phytoseiini Berlese 1913: 3; Phytoseiinae, Vitzthum 1941: 768.

Genus *Phytoseius* Ribaga

Phytoseius Ribaga 1904: 177

Phytoseius amba Pritchard & Baker

Phytoseius (*Pennaseius*) *amba* Pritchard & Baker 1962: 224; Blommers 1976: 85.
Phytoseius (*Phytoseius*) *amba*, Denmark 1966: 46.
Typhlodromus (*Phytoseius*) *amba*, van der Merwe 1968: 101.
Pennaseius amba, Matthysse & Denmark 1981: 352.
Phytoseius amba, Swirski & Ragusa 1978: 408; Moraes *et al.* 1986: 210, 2004a: 232; Chant & McMurtry 2007: 129; El-Banhawy & Knapp 2011: 47.

This species belongs to the *plumifer* species group as setae *J2* and *R1* are present (Chant and McMurtry 1994). It is widely distributed in sub-Saharan Africa, Madagascar (Demite *et al.* 2019), in La Réunion (Quilici *et al.*, 2000; Demite *et al.* 2019) and recently from one island of the Comoros Archipelago, Grande Comore (Kreiter *et al.* 2018b).

The biology of this species remains totally unknown.

If all details of collections were provided in the previous paper concerning La Réunion (Quilici *et al.* 2000), measurements of specimens collected and identified were not published. Measurements of specimens collected during this study are provided in table 30.

Table 29 Character measurements of adult females and males of *Euseius hima* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	♀					♂	
	La Réunion (15)	**Africa**	**Kenya**	**Madagascar**	**Holotype Rwanda**	**La Réunion**	**Madagascar**
	15, this study	14	4	32	1	4, this study	5
Dsl	**259** (238 – 275)	273 (248 – 288)	271 (259 – 281)	280 – 300	275	**254** (200 – 300)	230
Dsw	**160** (145 – 178)	174 (166 – 182)	171 (168 – 173)	168 – 175	173	**118** (115 – 120)	135
j1	**21** (18 – 25)	20 (18 – 22)	23 (22 – 26)	20 – 21	22	**22** (20 – 25)	21
j3	**25** (20 – 28)	24 (19 – 29)	24 (22 – 26)	27	26	**24** (23 – 25)	25
j4	**21** (20 – 23)	19 (14 – 22)	18 (17 – 19)	20	18	**16** (13 – 18)	18
j5	**20** (20 – 23)	19 (14 – 22)	16 (14 – 18)	18 – 20	18	**16** (13 – 18)	16
j6	**19** (18 – 23)	18 (16 – 21)	17	18 – 20	19	**16** (13 – 18)	18
J2	**20** (18 – 23)	20 (18 – 24)	18 (17 – 19)	20 – 21	19	**14** (13 – 15)	16
J5	**6** (5 – 8)	7 (5 – 8)	7 (7 – 8)	5 – 6	6	**5**	5
r3	**21** (20 – 23)	22 (18 – 27)	23 (22 – 24)	21	24	**18** (16 – 20)	22
R1	**15** (13 – 18)	16 (14 – 18)	14 (12 - 15)	18	16	**13** (10 – 15)	16
s4	**33** (30 – 35)	32 (27 – 37)	32 (31 – 34)	34 – 36	30	**23** (20 – 25)	28
S2	**25** (23 – 28)	25 (21 – 30)	22 (22 – 24)	25 – 27	24	**20** (18 – 20)	20
S4	**23** (20 – 25)	24 (19 – 29)	22 (22 – 23)	23 – 25	22	**18**	20
S5	**24** (23 – 28)	25 (21 – 29)	22 (22 – 24)	25 – 27	22	**16** (15 – 18)	22
z2	**26** (25 – 30)	25 (22 – 30)	25 (24 – 27)	27 – 29	26	**20** (18 – 25)	24
z4	**30** (28 – 33)	28 (22 – 34)	28 (26 – 30)	30 – 32	27	**21** (18 – 28)	26
z5	**21** (15 – 23)	21 (18 – 26)	16 (14 – 17)	18 – 20	19	**16** (13 – 18)	18
Z1	**20** (18 – 23)	21 (16 – 24)	18 (17 – 20)	20 – 21	22	**17** (13 – 18)	18
Z4	**23** (20 – 25)	22 (18 – 26)	21 (19 – 22)	23 – 25	24	**19** (15 – 18)	20
Z5	**44** (43 – 50)	44 (42 – 50)	46 (43 – 48)	45 – 50	45	**30**	40
st1-st1	**49** (48 – 50)	-	-	-	-	**44** (43 – 50)	-
st2-st2	**57** (55 – 60)	62 (58 – 67)	58 (58 – 60)	-	60	**51** (48 – 55)	-
st3-st3	**63** (60 – 68)	-	-	-	-	**50** (45 – 60)	-
st1-st3 ♀ / *st1-st5* ♂	**52** (50 – 55)	53 (48 – 56)	54 (53 – 57)	-	53	**125** (120 – 128)	-
st4-st4	**67** (60 – 75)	-	-	-	-	**39** (35 – 43)	-
st5-st5	**53** (50 – 65)	51 (45 – 58)	51 (48 – 52)	-	52	**39** (35 – 40)	-
Lisl	**20** (18 – 23)	-	-	-	-		
Lisw	**3** (3 – 3)	-	-	-	-	Not applicable	
Sisl	**10** (10 – 10)	-	-	-	-		
Vsl	**82** (75 – 90)	87 (78 – 94)	88 (84 – 91)	82 – 86	86	**113**	86
Vsw *ZV2*	**40** (38 – 43)	43 (38 – 50)	43 (41 – 45)	46 – 54	42	**135** (125 – 138)	-
Vsw *anus*	**47** (43 – 50)	51 (45 – 58)	51 (50 – 54)	-	45	**63**	-
JV5	**23** (15 – 28)	-	-	29 – 30	-	**25** (23 – 28)	23
SgeIV	**21** (20 – 23)	-	25 (24 – 27)	-	-	Not applicable	
StiIV	**21** (20 – 23)	-	24 (24 – 26)	-	-		
StIV	**33** (30 – 38)	36 (24 – 48)	43 (41 – 48)	38 – 43	34	**35** (30 – 40)	32
Scl	**20** (15 – 23)	23 (19 – 29)	24 (20 – 26)	20	24	Not applicable	
Scw	**3** (3 – 5)	-	-	-	-		
Fdl	**21** (18 – 25)	24	22	22	-	**23** (20 – 25)	18
No teeth Fd	**3**	3	-	-	-	**8**	-
Mdl	**20** (18 – 23)	21	21 (19 – 22)	22	-	**22** (18 – 25)	18
No teeth Md	**2**	2	-	-	-	**1**	-
Shaft	Not applicable					**18**	18

Sources of measurements – For ♀♀: Africa (Benin 2♀♀, Ghana 1♀, Kenya 2♀♀, Rwanda 8♀♀, Uganda 1♀): Moraes *et al.* (2001); Madagascar: Blommers (1976); Holotype Rwanda and Kenya: Moraes *et al.* (1989). For ♂♂: Madagascar: Blommers (1976). - : not provided.

Specimens examined: 2 ♀♀ + 1 ♂ + 3 im. in total, 2 ♀♀ + 1 ♂ measured. Piton de la Fournaise – Pas de Bellecombe (aasl 2350 m, Long 55°41'20" E, Lat 21°13'20" S), 1 ♀ + 1 ♂ + 3 im. on *Psiadia anchusifolia*, 29/12/2016; Sainte-Rose – Forêt Mourouvin (aasl 871m, Long 55°46'12" E, Lat 21°10'48" S), 1 ♀ on *Boehmeria penduliflora* Wedd. ex D.G. Long, 21/1/2017.

Remarks: measurements of characters of the two females of *P. amba* from La Réunion (Table 30) compared to those of specimens from neighbouring countries show a slight variation of dimensions depending of the geographical origin. Measurements of characters of the two collected females are close from those of specimens from South Africa (Moraes *et al*. 1989), especially setae *j1, J2, z3, Z5, S6, r3, JV5* and spermathecal width. Setae *j3* and *z3* are smaller and macrosetae of leg IV are longer in specimens from La Réunion compared to specimens from Comoros Archipelago but numbers of specimens (2 and 1, respectively) are very low in both cases.

Table 30 Character measurements of adult females and one adult male of *Phytoseius amba* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	♀								♂	
	La Réunion	**Africa**	**Grande Comore**	**Kenya**	**Madagascar**	**Senegal**	**South Africa**	**Holotype Zaïre**	**La Réunion**	**South Africa**
	2, this study	29	1	8	6	3	10	1	1, this study	1
Dsl	**301** (300 – 303)	282 (264 – 304)	270	288 (271 – 312)	-	296 (288 – 303)	264 – 284	283	**255**	230
Dsw	**150** (150 – 150)	141 (133 – 149)	155	144 (139 – 149)	-	149 (148 – 155)	130 – 145	165	**125**	127
j1	**24** (23 – 25)	22 (19 – 27)	23	24 (22 – 26)	19 – 25	24 (23 – 25)	24 – 26	24	**20**	21
j3	**54** (53 – 55)	49 (40 – 56)	63	50 (41 – 60)	50 – 56	52 (50 – 53)	46 – 50	42	**40**	44
j4	**5** (5 – 5)	4 (3 – 5)	5	4 (2 – 5)	-	5 (4 – 5)	7	3	**8**	-
j5	**5** (5 – 5)	4 (3 – 5)	5	4 (2 – 5)	-	6 (5 – 8)	7	3	**8**	-
j6	**6** (5 – 8)	5 (3 – 6)	6	5 (2 – 7)	-	6 (5 – 8)	7	4	**8**	-
J2	**9** (8 – 10)	6 (5 - 8)	9	5	-	5 (5 – 8)	9 – 11	6	**10**	-
J5	**13** (13 – 13)	10 (8 – 13)	8	11 (10 – 12)	-	11 (10 – 12)	11 – 14	11	**13**	-
r3	**43** (38 – 48)	40 (34 – 46)	39	39 (34 – 43)	37 – 44	46 (43 – 48)	37 – 45	41	**25**	31
R1	**14** (13 – 15)	13 (10 – 16)	15	14 (12 – 17)	-	14 (13 – 15)	12 – 16	12	**8**	11
s4	**81** (68 – 95)	81 (53 – 102)	89	76 (70 – 86)	78 – 82	81 (79 – 83)	70 – 85	81	**48**	53
s6	**69** (58 – 80)	77 (48 – 96)	75	78 (67 – 86)	71 – 78	84 (80 – 88)	60 – 80	79	**38**	-
z2	**8**	7 (5 – 10)	13	7 (5 – 10)	-	5 (5 – 6)	9 – 11	5	**10**	-
z3	**28** (25 – 30)	23 (16 – 27)	43	24 (19 – 29)	19 – 31	27 (24 – 30)	26 – 29	17	**25**	26
z4	**11** (10 – 13)	8 (5 – 11)	10	8 (5 – 12)	-	6 (5 – 8)	9 – 11	5	**15**	-
z5	**6** (5 – 8)	4 (3 – 5)	5	5 (2 – 5)	-	6 (5 – 8)	7	5	**5**	-
Z4	**64** (48 – 80)	62 (48 – 70)	63	62 (55 – 67)	59 – 65	63 (58 – 68)	60 – 80	64	**33**	40
Z5	**69** (53 – 85)	76 (59 – 86)	70	75 (67 – 82)	64 – 77	71 (68 – 75)	57 – 80	83	**35**	38
st1-st1	**65** (60 – 70)	-	68	-	-		50 – 60	-	**33**	-
st2-st2	**74** (73 – 75)	69 (64 – 72)	63	70 (67 – 72)	-	69 (67 – 70)	-	79	**38**	-
st3-st3	**83** (80 – 85)	-	68	-	-		-	-	**68**	-
st1-st3 ♀ / *st1-st5* ♂	**61** (58 – 65)	60 (56 – 64)	58	59 (53 – 60)	-	61 (60 – 63)	68 – 75	60	**115**	-
st4-st4	**88** (78 – 98)	-	73	-	-		-	-	**55**	-
st5-st5	**61** (55 – 68)	67 (62 – 74)	55	69 (67 – 72)	-	64 (63 – 65)	67 – 72	63	**45**	-
Lisl	-	-	18	-	-	-	-	-		
Lisw	-	-	2	-	-	-	-	-	Not applicable	
Sisl	-	-	8	-	-	-	-	-		
Vsl	**105** (105 – 105)	99 (86 – 106)	83	99 (84 – 108)	-	97 (90 – 105)	90 – 98	100	**108**	100
Vsw *ZV2*	**58**	55 (50 – 64)	48	60 (55 – 67)	-	52 (50 – 53)	48 – 55	53	**125**	144
Vsw *anus*	**55**	49 (43 – 56)	38	49 (48 – 53)	-	49 (48 – 50)	-	46	**65**	-
JV5	**55** (45 – 65)	-	45	-	54		45 – 51		**35**	24
SgeIV	**29** (25 – 33)	25 (19 – 32)	25	26 (24 – 34)	23 – 27	24 (23 – 25)	24 – 28	21	**18 knob.**	20 knob.
StiIV	**39** (33 – 45)	34 (26 – 40)	25	33 (29 – 38)	30 – 36	25 (23 – 28)	30 – 35	31	**20 knob.**	24 knob.
StIV	**38** (30 – 43)	35 (27 – 43)	23	33 (26 – 43)	30 – 34	26 (23 – 28)	33 – 38	39	**30 knob.**	28 knob.
SttIV	**38** (37 – 40)	32 (28 – 38)	23	-	28 – 32	30 (28 – 33)	26 – 30	-	**40 knob.**	26 knob.
Scl	**21** (20 – 23)	13 (8 – 19)	18	20 (17 – 24)	-	11 (10 – 13)	16 – 18	12	Not applicable	
Scw	**10**	-	10	-	-	-	14 – 16	-		
Fdl	**28**	25(23 – 26)	23	20 (17 – 24)	-	-	24	17	**18**	17
No teeth Fd	**2**	2 – 3	1	-	-	-	2	-	**2**	2
Mdl	**26** (25 – 28)	25(23 – 6)	23	24	-	-	24	17	**18**	17
No teeth Md	**1**	1 – 2	1	-	-	-	1	-	**1**	1
Shaft	Not applicable								**18**	14

Sources of measurements – For ♀♀: Africa (Burundi 8♀♀, Cameroon 1♀, Ghana 2♀♀, Kenya 5♀♀, Rwanda 7♀♀, Sierra Leone 1♀, South Africa 4♀♀, DR Congo 1♀): Ueckermann *et al.* (2007); Grande Comore: Kreiter *et al.* (2018b); Madagascar: Blommers (1976); Senegal: Kade *et al.* (2011); South Africa: van der Merwe (1968); Holotype Zaïre and Kenya: Moraes *et al.* (1989). For ♂♂: South Africa: van der Merwe (1968). - : not provided.

For male specimens, measurements (Table 30) concern only one individual from La Réunion Island and one from South Africa. Values obtained for the male of La Réunion Island are slightly lower, except for some setae and for macrosetae of the leg IV, especially macrosetae of telotarsi of legs IV that are longer in the specimen of La Réunion Island.

Phytoseius crinitus Swirski & Shechter

Phytoseius (*Dubininellus*) *crinitus* Swirski & Shechter 1961: 102.
Phytoseius crinitus, Amitai & Swirski 1966: 21; Swirski & Amitai 1966: 11; Denmark 1966: 66; Moraes *et al.* 1986: 220, 2004a: 236; Chant & McMurtry 2007: 129.

This species belongs to the *horridus* species group as setae *J2* and *R1* are absent (Chant and McMurtry 1994). This species was recorded in several countries of Asia, in Burundi, Madagascar (Demite *et al.* 2019) and was already known from La Réunion (Quilici *et al.* 2000; Demite *et al.* 2019). If all details of collections were provided in the previous paper, measurements of specimens collected and identified were not given. Measurements of specimens collected during this study are provided in table 31. The biology of this species remains totally unknown.

Specimens examined: 8 ♀♀ in total, 5 ♀♀ measured. Saint-Pierre – Armeflhor Station (aasl 450 m, Long 55°31'9" E, Lat 21°18'14" S), 2 ♀♀ on *P. americana*, 15/12/2015; Sainte-Rose – Anse des Cascades (aasl 5 m, Long 55°49'48" E, Lat 21°10'48" S), 3 ♀♀ on *Terminalia catappa* L., 27/12/2016; Le Tampon – Ligne des 400 (aasl 463 m, Long 55°30'36" E, Lat 21°17'24" S), 2 ♀♀ on *C. glauca*, 10/1/2017; Saint-Anne – Bassin bleu (aasl 6 m, Long 55°45'0" E, Lat 21°4' 48" S), 1 ♀ on *Ipomoea* sp., 15/1/2017.

Remarks: specimens of this species have been recorded and measured from Burundi. Measurements of our specimens from La Réunion (Table 31) fit well with those of Burundi with sometimes slightly greater values, for example for setae *s4* and *Z4*.

Values for both type of specimens are higher than those obtained for specimens from Asia (Table 31).

Phytoseius haroldi Ueckermann & Kreiter

Phytoseius haroldi Ueckermann & Kreiter, 2002: 339; Chant & McMurtry 2007: 129.

This species belongs to the *horridus* species group as setae *J2* and *R1* are absent (Chant and McMurtry 1994). This species was described Kreiter *et al.*(2002) but have never been recorded from other countries or recorded again in La Réunion since its description. This species was abundant on lower vegetation in a study of companion plants in citrus orchard. It seems that this species prefers low plants but despite this observation that has to be confirmed, the biology of this species remains totally unknown. Measurements of some additional females (9) and of some males are provided in table 32.

This is the first new record In La Réunion since the original description and the second record in Indian Ocean after recent records of Ferragut and Baumann (2019).

Specimens examined: 349 ♀♀ + 135 ♂♂ + 95 im. in total, 9 ♀♀ + 8 ♂♂ measured. Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 2 ♀♀ on *D. incanum*, 1/8/2015; 1 ♀ on *Dombeya acutangula* Cav., 1/11/2015; Saint-Joseph – Center of the city (aasl 37 m, Long 55°37'9" E, Lat 21°22'44" S), 4 ♀♀ + 1 ♂ on *S. torvum*, 16/12/2015; Saint-Pierre – Bassin-Plat CIRAD research station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 4 ♀♀ in plot CC, 1 ♀ + 2 ♂♂ in plot M, 5 ♀♀ in plot H, 12/4/2016; 1 ♀ + 1 ♂ + 1 im. on *D. incanum*, 23/6/2016; 1 ♀ on *D. acutangula*, 23/6/2016; 2 ♀♀ in plot HM, 1 ♀ in plot M, 1 ♀ in plot CC, 23/8/2016; 1 ♀ in plot CC, 2 ♀♀ + 1 ♂ + 1 im. in plot H, 15/12/2016; Petite Île – Les bas, Doris Morel farm (aasl 230 m, Long 55°34'1" E, Lat 21°21'22" S), 1 ♀ on *D. incanum*, 31/5/2016; Petite Île – Piton Bloc, Yébo Luguy farm (aasl 973 m, Long 55°34'64" E, Lat 21°18'64" S), 1 ♀ on *Raphanus raphanistrum* L., 29/11/2016; Le Tampon – Ligne des 400 (aasl 463 m, Long 55°30'36" E, Lat 21°17'24" S), 2 ♀♀ + 1 ♂ + 1 im. on *Ipomoea* sp.,

Table 31 Character measurements of adult females of *Phytoseius crinitus* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	La Réunion	Burundi	Hong-Kong	Japan	Paratype Hong-Kong
	5, this study	3	7	1	**1**
Dsl	**285** (280 – 295)	276 (275 – 278)	262 – 280	290	271
Dsw	**147** (140 – 153)	153 (153 – 154)	-	160	126
j1	**27** (25 – 30)	30 (29 – 32)	28 (25 – 30)	30	29
j3	**36** (33 – 40)	34 (32 – 35)	32 (28 – 36)	30	28
j4	**5** (3 – 8)	6 (5 – 6)	4 (3 – 8)	4	6
j5	**5** (5 – 8)	5	4 (3 – 8)	5	6
j6	**5** (5 – 8)	6	4 (3 – 8)	5	6
J5	**5** (5 – 8)	8	4 (3 – 8)	7	8
r3	**43** (40 – 45)	42 (41 – 42)	41 (38 – 46)	42	38
s4	**118** (113 – 125)	107 (106 – 107)	106 (102 – 107	109	103
s6	**75** (65 – 83)	75 (74 – 76)	72 (64 – 84)	75	83
z2	**13** (10 – 15)	14 (13 – 14)	14 (13 – 15)	16	14
z3	**30** (25 – 33)	31 (30 – 32)	29 (25 – 33)	32	28
z4	**11** (10 – 13)	11 (10 – 11)	11 (9 – 13)	10	12
z5	**5** (3 – 8)	4 (4 – 5)	4 (3 – 8)	5	7
Z4	**94** (90 – 100)	84 (82 – 85)	79 ((76 – 81)	77	78
Z5	**69** (65 – 73)	72	61 (55 – 64)	67	65
st1-st1	**53** (53 – 55)	-	-	-	-
st2-st2	**60** (58 – 63)	60 (60 – 61)	-	-	-
st3-st3	**71** (68 – 73)	-	-	-	-
st1-st3	**55** (53 – 58)	55 (54 – 56)	-	-	-
st4-st4	**75** (75 – 75)	-	-	-	-
st5-st5	**58** (55 – 60)	61 (60 – 61)	-	-	-
Lisl	**29** (25 – 33)	-	-	-	-
Lisw	**3** (3 – 3)	-	-	-	-
Vsl	**85** (75 – 90)	92 (88 – 97)	76 – 89	-	-
Vsw *ZV2*	**34** (33 – 35)	36 (35 – 37)	33 – 38	-	-
Vsw *anus*	**47** (45 – 48)	47 (45 – 48)	38 – 51	-	-
JV5	**45** (43 – 50)	-	42 (38 – 46)	45	43
Scl	**12** (10 – 13)	10 – 25	-	-	-
Scw	**10** (10 – 10)	-	-	-	-
SgeIV	**13** (10 – 15)	9 (8 – 9)	9 (8 – 10)	14	10
StiIV	**50** (48 – 55)	48 (46 – 49)	48 (43 – 51)	51	31
StIV	**28** (28 – 30)	26 (25 – 26)	23 (20 – 25)	25	18
SttIV	**24** (23 – 26)	25 (24 – 25)	20 – 23	24	-
Fdl	**22** (20 – 23)	22	23 – 25	-	-
No teeth Fd	**3**	3	3	-	-
Mdl	**23** (20 – 25)	24	23 – 25	-	-
No teeth Md	**1**	1	1	-	-

Sources of measurements – Burundi: Ueckermann *et al.* (2007); Hong-Kong: Swirski & Shechter (1961); Japan: Ehara (1967); Paratype Hong-Kong: Denmark (1966); - : not provided.

Table 32 Character measurements of adult females and males of *Phytoseius haroldi* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	♀			♂	
	La Réunion 9, this study	**Types La Réunion** 5	**Mauritius** 8	**La Réunion** 8, this study	**Mauritius** 1
Dsl	**271** (260 – 273)	280 (277 – 284)	291 (284 – 296)	**200** (183 – 213)	218
Dsw	**154** (148 – 155)	149 (145 – 151)	131(127 – 134)	**129** (115 – 140)	122
j1	**28**	31 (28 – 32)	30 (29 – 31)	**22** (20 – 24)	22
j3	**48**	44	45 (40 – 49)	**31** (30 – 35)	32
j4	**5** (4 – 6)	7 (6 – 9)	7 (6 – 7)	**5** (4 – 5)	6
j5	**5** (4 – 6)	7 (6 – 9)	7 (6 – 7)	**5** (4 – 5)	6
j6	**5** (4 – 6)	6 (6 – 7)	7 (6 – 7)	**5** (4 – 5)	6
J5	**4** (4 – 6)	6	7 (7 – 8)	**4** (3 – 5)	6
r3	**43** (40 – 48)	43 (41 – 44)	44 (43 – 45)	**31** (29 – 36)	29
s4	**109** (100 – 118)	113 (107 – 120)	105 (99 – 110)	**68** (63 – 75)	68
s6	**76** (63 – 83)	83 (82 – 85)	82 (79 – 87)	**51** (50 – 55)	50
z2	**13** (8 – 15)	9	9 (8 – 10)	**8** (7 – 11)	8
z3	**22** (18 – 30)	24 (22 – 25)	24 (23 – 25)	**13** (10 – 15)	19
z4	**5** (4 – 6)	6	8 (8 – 9)	**8** (5 – 13)	8
z5	**5** (4 – 6)	6	6 (5 – 6)	**5** (4 – 5)	6
Z4	**75** (68 – 81)	77 (72 – 82)	78 (75 – 81)	**45** (40 – 50)	44
Z5	**75** (63 – 88)	78 (72 – 85)	76 (70 – 82)	**35** (33 – 38)	37
st1-st1	**58** (50 – 60)	**60*** (3)	-	**52** (45 – 68)	-
st2-st2	**67** (63 – 70)	64 (54 – 65)	70 (67 – 72)	**56** (55 – 58)	-
st3-st3	**75** (68 – 79)	**75*** (3)	-	**67** (58 – 80)	68
st1-st3 ♀ / *st1-st5* ♂	**57** (43 – 68)	56 (54 – 59)	59 (57 – 67)	**93** (83 – 100)	110
st4-st4	**92** (68 – 130)	**93 (92 – 95)*** (3)	-	**57** (53 – 60)	-
Gensl	**101** (95 – 108)	**103 (100 – 105)***	101 (95–107)		
Gensw *st5*	**76** (68 – 80)	**75 (68 – 80)***	78 (72–84)	Not applicable	
Gensw post. corn.	**79** (68 – 88)	**76 (75 – 78)***	-		
st5-st5	**70** (65 – 75)	66 (63 – 68)	78 (72 – 84)	**48** (44 – 53)	62
Lisl	**25** (23 – 26)	**23 (23 – 25)*** (3)	23 (21 – 24)	Not applicable	
Lisw	**4** (3 – 5)	**4*** (3)	-		
Vsl	**97** (88 – 108)	94 (88 – 98)	100 (97 – 104)	**83** (73 – 100)	86
Vsw *ZV2*	**54** (43 – 60)	51 (50 – 54)	50 (46 – 53)	**118** (85 – 142)	133
Vsw *anus*	**54** (45 – 58)	54 (50 – 57)	52 (50 – 53)	**88** (75 – 105)	-
JV5	**48** (40 – 56)	50 (47 – 54)	51 (47 – 54)	**17** (15 – 20)	17
SgeIV	**21** (18 – 25)	19	21 (20 – 22)	**14** (13 – 15)	14
StiIV	**47** (43 – 55)	45 (43 – 47	45 (40 – 52)	**22** (18 – 25)	22
StIV	**31** (28 – 37)	30 (28 – 32)	32 (29 – 35)	**22** (20 – 25)	22
SttIV	**24** (20 – 28)	23 (22 – 25)	24 (23 – 25)	**22** (20 – 25)	18
Scl	**25** (20 – 28)	17 (16 – 19)	28 (26 – 31)	Not applicable	
Scw	**10** (8 – 13)	**8 (8 – 10)*** (3)	-		
Fdl	**22** (20 – 25)	28	24 (23 – 25)	**13** (13 – 14)	16
No teeth Fd	**2**	**4 (3 + 1)*** (3)	3 + 1	**0**	0
Mdl	**24** (23 – 26)	25	27 (25 – 28)	**15** (15 – 18)	18
No teeth Md	**1**	**1** (3)*	**1**	**0**	0
Shaft	Not applicable			**18** (15 – 20)	12

Sources of measurements – For ♀♀: Types La Réunion: Kreiter *et al.* (2002); *New measurements on one paratype female; Mauritius: Ferragut and Baumann (2019). For ♂♂: Mauritius: Ferragut & Baumann (2019). - : not provided.

17/12/2016; Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 11 ♀♀ on *P. guajava*, 16/12/2016; La Saline – Jardin d'Eden (aasl 70 m, Long 55°13'46" E, Lat 21°20'25" S), 1 ♀ on *Cananga odorata* (Lam.) Hook. f. & Thomson, 22/1/2017; Langevin – Jacqueline Waterfall (aasl 5 m, Long 55°64'40" E, Lat 21°38'9" S), 1 ♀ on *Scaevola taccada* (Gaertn.) Roxb., 1 ♀ on *I. purpurea*, 19/2/2017; Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 4 ♀♀ + 1 ♂ + 3 im. on *B. pilosa*, 2 ♂♂ + 1 im. on *P. hysterophorus*, 1 ♀ on *E. hypericifolia*, 1 ♀ on *Cardiospermum halicacabum* L., 5 ♀♀ + 1 ♂ + 1 im. on *T. labialis,* 20/2/2017*;* Montvert-les-Hauts – EARL Le Mont Vert farm (aasl 582 m, Long 55°32'19" E, Lat 21°19'42" S), 3 ♀♀ on *L. camara*, 22/2/2017; Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 3 ♀♀ on *Duranta serratifolia*, 27/2/2017; 1 ♀ + 1 ♂ on *Sida acuta*, 1 ♀ on *E. hypericifolia*, 1 im. on *Tephrosia purpurea* (L.) Pers., 3 ♀♀ + 1 im. on *I. obscura*, 2 ♀♀ + 1 im. on *A. hispidum*, 1 ♀ + 3 ♂♂ on *L. leucocephala*, 1 ♀ on *C. halicacabum*, 3 ♀♀ + 2 ♂♂ + 1 im. on *M. coromandelianum,* 30/3/2017; 2 ♀♀ in plot H, 13 ♀♀ + 1 im. in plot M, 6/4/2017; 1 ♀ on *E. hypericifolia*, 8 ♀♀ + 1 ♂ + 3 im. on *T. purpurea*, 9 ♀♀ + 3 ♂♂ + 2 im. on *I. obscura*, 3 ♀♀ on *B. pilosa*, 1 ♀ on *T. labialis,* 1 ♀ on *A. viridis*, 4 ♀♀ + 2 ♂♂ + 1 im. on *P. hysterophorus*, 2 ♀♀ on *Digitaria radicosa* (J.Presl) Miq.*,* 19/6/2017; 1 ♀ on *D. radicosa*, 20/6/2017; 246 ♀♀ + 113 ♂♂ + 76 im. on *D. incanum*, 3 ♀♀ on *D. acutangula*, 3/7/2017.

Remarks: measurements of characters of nine females collected and measured during this study (Table 32) are similar to those obtained from type material published in Kreiter *et al.*(2002) and from specimen females collected by Ferragut and Baumann (2019). Several males have been collected during this study but a male collected for the first time by Ferragut and Baumann (2019) in Mauritius was described before submission of this paper and the description of males collected during this study. Dimensions of eight additional male specimens (Table 32) agree well with those of the single specimen male collected by Ferragut and Baumann (2019), except slightly shorter *z3*, *st1-st5* length, *st5-st5* length, and both fixed and movable digit lengths of the chelicerae and longer spermatodactyl in La Réunion Island specimens.

Phytoseius intermedius Evans & Macfarlane

Phytoseius (*Dubininellus*) *intermedius* Evans & Macfarlane 1961: 587; Denmark 1966: 70; Gupta 1977: 636.
Phytoseius (*Phytoseius*) *intermedius*, Ehara 1972: 170; Prasad 1974: 171; Ehara 1975: 27; Blommers 1976: 82; Moraes *et al.* 1986: 222, 2004a: 242; Chant & McMurtry 2007: 129.
Phytoseius(*Phytoseius*) *yira* Pritchard & Baker 1962: 227 (synonymy according to Denmark 1966).

This species belongs to the *horridus* species group as setae *J2* and *R1* are absent (Chant and McMurtry 1994). It was recorded in several countries of Asia, Africa, Madagascar (Demite *et al.* 2019) and was already known from La Réunion (Quilici *et al.* 2000; Demite *et al.* 2019). If all details of collections were provided in previous papers, measurements of specimens collected and identified were not given. Measurements of specimens collected during this study are provided in table 33. The biology of this species remains totally unknown.

Specimens examined: 7 ♀♀ + 1 im. in total, 5 ♀♀ measured. Saint-Joseph – Manapany, SCEA Multiplantes (aasl 404 m, Long 55°35'37" E, Lat 21°22'9" S), 2 ♀♀ + 1 im. on *Mangifera indica* L., 1 ♀ on *Rivina humilis* L., 14/2/2017; Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 2 ♀♀ on *A. viridis*, 1 ♀ on *A. heterophyllus*, 27/2/2017; 1 ♀ on *L. leucocephala*, 30/3/2017.

Remarks: measurement values of morphological characters of specimens from La Réunion (Table 33) and specimens from neighbouring countries are very close, especially for specimens from Africa. Some values for specimens from Asia are slightly lower.

Phytoseius punicae Chinniah & Mohanasundaram

Phytoseius punicae Chinniah & Mohanasundaram, 2001: 526.

Table 33 Character measurements of adult females of *Phytoseius intermedius* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	Réunion	Africa	India	Japan	Pakistan	Holotype RD Congo
	5, this study	9	1	3?	1	1
Dsl	**301** (290 – 310)	286 (268 – 304)	280	310	287	270
Dsw	**148** (143 – 150)	148 (140 – 157)	152	190	149	149
j1	**24** (23 – 25)	23 (19 – 26)	26	26	20	26
j3	**22** (20 – 23)	22 (19 – 24)		20	22	20
j4	**5**	6 (5 – 7)	Short	7	6	5
j5	**5**	6 (5 – 7)	Short	6	6	5
j6	**5**	7 (6 – 8)	Short	8	8	6
J5	**5**	8 (6 – 9)	Short	8	8	6
r3	**36** (35 – 38)	35 (32 – 38)	-	36	33	33
s4	**60** (58 – 63)	59 (56 – 61)	62	54	55	63
s6	**74** (70 – 75)	74 (69 – 78)	66	64	74	75
z2	**21** (20 – 23)	20 (18 – 22)	-	18	18	20
z3	**32** (30 – 33)	32 (27 – 37)	30	30	31	31
z4	**16** (15 – 18)	16 (11 – 20)	12	16	13	14
z5	**6** (5 – 8)	7 (5 – 8)	Short	8	8	5
Z4	**85** (80 – 88)	76 (72 – 85)	80	69	76	78
Z5	**62** (60 – 65)	60 (56 – 64)	62	62	55	63
st1-st1	**50** (48 – 53)	-	-		-	-
st2-st2	**57** (55 – 58)	57 (56 – 59)	-		-	-
st3-st3	**70** (63 – 75)	-	-		-	-
st1-st3	**53** (50 – 55)	53 (48 – 57)	-		-	-
st4-st4	**79** (73 – 85)	-	-		-	-
st5-st5	**64** (63 – 65)	65 (62 – 69)	66		-	66
Lisl	**35** (33 – 38)	-	20		-	-
Lisw	**3**	-	-		-	-
Sisl	**13** (13 – 13)	-	20		-	-
Vsl	**86** (83 – 90)	89 (84 – 99)	80		-	91
Vsw *ZV2*	**31** (28 – 33)	34 (31 – 37)	-		-	33
Vsw *anus*	**53** (50 – 55)	49 (41 – 54)	50		-	47
JV5	**29** (25 – 33)	-	30	23	34	-
Scl	**8** (8 – 10)	6 (5 – 6)	-		-	-
Scw	**5**	-	-		-	-
Fdl	**17** (15 – 20)	19	-		-	-
No teeth Fd	**3**	2	3		-	-
Mdl	**17** (15 – 20)	20	-		-	-
No teeth Md	**1**	1	1		-	-

Sources of measurements – Africa: Ueckermann *et al.* (2007); India: Chinniah & Mohanasundaram (2001); Japan: Ehara (1972); Pakistan: Denmark (1966); Holotype RD Congo: Ueckermann *et al.* (2007); - : not provided.

This species belongs to the *plumifer* species group as setae *J2* and *R1* are present (Chant and McMurtry 1994).

This species was recorded in India, in Tamil Nadu state (Demite *et al.* 2019). Its biology is totally unknown.

This is the first record of this species in La Réunion Island.

Specimens examined: A single ♀ in total, measured. Le Tampon – Bras de Pontho, Aldo Grace farm (aasl 661 m, Long 55°29'48" E, Lat 21°14'33" S), 1 ♀ on *D. incanum*, 21/2/2017.

Remarks: measurement values of morphological characters (Table 34) were compared to those obtained for specimens of India, the only country in which *Phytoseius punicae* was recorded and specimens measured. Values of measurements are very close except for seta *j3*, *z3* and *st1-st3* length of sternal shield that are smaller compared to specimens of India. Macrosetae *StIV* is however longer in the single specimen of La Réunion Island.

Phytoseius woodburyi De Leon

Phytoseius (*Phytoseius*) *woodburyi* De Leon 1965b: 130; Muma & Denmark 1968: 236; Kreiter & Moraes 1997: 380.
Phytoseius (*Dubininellus*) *woodburyi*, Denmark 1966: 64.
Phytoseius woodburyi, Moraes *et al*. 1986: 229; 2004a: 258; Chant & McMurtry 2007: 131.

This species belongs to the *horridus* species group as setae *J2* and *R1* are absent (Chant and McMurtry 1994).

This species was recorded in several countries of the Caribbean area, South America, Hawaii and India (Demite *et al.* 2019). Its biology is totally unknown.

This is the first record of this species in La Réunion.

Specimens examined: 2 ♀♀ in total, both measured. Montvert-les-Hauts – EARL Le Mont Vert farm (aasl 582 m, Long 55°32'19" E, Lat 21°19'42" S), 1 ♀ on *C. annuum*, 15/5/2015; Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 1 ♀ on *D. acutangula*, 23/6/2016.

Remarks: measurements of morphological characters of *P. woodburyi* female specimens from La Réunion (Table 35) are very close from measurements for specimens from other

Table 34 Character measurements of one adult female of *Phytoseius punicae* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	La Réunion 1, this study	India 5	Characters	La Réunion 1, this study	India 5	Characters	La Réunion 1, this study	India 5
Dsl	**267**	256 – 284	*z2*	**8**	6 – 10	Vsl	**105**	100
Dsw	**125**	124 – 128	*z3*	**25**	50 – 54	Vsw *ZV2*	**40**	50
j1	**23**	24 – 30	*z4*	**8**	6 – 10	Vsw *anus*	**55**	-
j3	**58**	70	*z5*	**8**	6 – 10	*JV5*	**58**	60 – 64
j4	**3**	6 – 10	*Z4*	**78**	84 – 86	*SgeIV*	**25**	26
j5	**5**	6 – 10	*Z5*	**83**	86 – 88	*StiIV*	**35**	32
j6	**8**	6 – 10	*st1-st1*	**55**	-	*StIV*	**35**	24
J2	**5**	6 – 10	*st2-st2*	**68**	70	*SttIV*	**30**	28
J5	**13**	6 – 10	*st3-st3*	**78**	-	Scl	**20**	-
r3	**45**	46 – 50	*st1-st3*	**60**	80	Scw	**10**	-
R1	**15**	18 – 20	*st4-st4*	**93**	-	Fdl	**25**	-
s4	**100**	102 – 110	*st5-st5*	**63**	60	No teeth Fd	**3**	2
s6	**83**	90	Lisl	**30**	20	Mdl	**28**	-
			Lisw	**3**	-	No teeth Md	**2**	1
			Sisl	**13**	20			

Sources of measurements – India (Tamil Nadu): Chinniah & Mohanasundaram (2001); - : not provided.

countries, even very far from Indian Ocean. The only two specimens of La Réunion Island have however some longer setae, especially *s4*, *Z4*, and macrosetae *SgeIV*.

Genus *Platyseiella* Muma

Platyseiella Muma 1961a: 280; Chant 1965a: 370; Muma & Denmark 1970: 56; Chant & McMurtry 1994: 233; 2007: 131.
Amblyseius (*Platyseiella*) Muma, van der Merwe 1968: 168.
Phytoseius (*Platyseiella*) Muma, Wainstein 1970: 1726.
Proprioseiopsis (*Platyseiella*) Muma, Karg 1983: 302.

Platyseiella eliahui Ueckermann

Platyseiella eliahui Ueckermann 1992: 20; Moraes *et al.* 2004a: 259; Chant & McMurtry 2007: 131.

This species belongs to the *platypilis* species group as setae *r3* are inserted on the dorsal shield and setae *JV1* are off the ventrianal shield (Chant and McMurtry 1994). It was only recorded from South Africa (Demite *et al.* 2019). Its biology is totally unknown.

This is the first record of this species in La Réunion Island.

Specimens examined: 2 ♀♀ in total, both measured. Le Tampon – Grand Tampon, Janick Bénard farm (aasl 1100 m, Long 55°34'12" E, Lat 21°16'48" S), 2 ♀♀ on *P. aquilinum,* 7/1/2016.

Remarks: measurements of morphological characters (Table 36) agree well with those obtained for specimens from South Africa and Zambia.

Sub-family Typhlodrominae Wainstein

Typhlodromini Wainstein 1962: 26; Typhlodrominae, Chant & McMurtry 1994: 235.

Tribe Paraseiulini Wainstein

Paraseiulini Wainstein 1976: 697; Chant & McMurtry 1994: 243; 2007: 141.

Genus *Kuzinellus*

Kuzinellus Wainstein 1976: 699.
Paraseiulus (*Kuzinellus*), Karg 1983: 322.
Typhlodromus ecclesiasticus group, Chant & Yoshida-Shaul 1986: 447.
Paraseiulus Muma 1961: 299 (part).

Kuzinellus scytinus (Chazeau)

Typhlodromus scytinus Chazeau 1970: 6.
Paraseiulus scytinus, Moraes *et al.* 1986: 206.
Kuzinellus scytinus Moraes *et al.* 2004a: 274; Chant & McMurtry 2007: 144.

This species belongs to the *ecclesiasticus* species group that contains 36 species (Chant and McMurtry 20017) as setae of the dorsal shield are setiform.

This species was recorded in Burundi, Rwanda, Australia, Madagascar (Demite *et al.* 2019) and it was already recorded in previous survey (Quilici *et al.* 2000; Demite *et al.* 2019). If all details of collections were provided in previous papers, measurements of specimens collected and identified were not given. Measurements of specimens collected during this study are provided in table 37. The biology of this species remains totally unknown.

Specimens examined: 2 ♀♀ in total, both measured. Le 19^{e}– Plaine des Caffres, JL Robert farm (aasl 1000 m, Long 55°32'9" E, Lat 21°14'16" S), 1 ♀ on *E. sonchifolia*, 15/12/2015; Le

Table 35 Character measurements of adult females of *Phytoseius woodburyi* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	La Réunion	Brazil	Guadeloupe	Holotype Puerto Rico
	2, this study	5	6	1
Dsl	**280 – 295**	279 (265 – 310)	286 (283 – 293)	272
Dsw	**155 – 163**	145 (140 – 150	160 (156 – 163)	135
j1	**28**	29 (28 – 31)	29 (26 – 31)	28
j3	**35 – 38**	33 (33 – 35)	31 (29 – 31)	31
j4	**6**	5 (5 – 6)	5 (5 – 7)	6
j5	**5**	5 (5 – 6)	5 (5 – 7)	6
j6	**6 – 8**	5 (5 – 6)	6 (5 – 7)	6
J5	**8**	6 (5 – 8)	7	6
r3	**43 – 48**	43 (40 – 46)	44 (43 – 48)	39
s4	**138**	118 (110 – 125)	121 (115 – 130)	119
s6	**73 – 90**	78 (73 – 82)	81 (77 – 86)	75
z2	**14 – 15**	13 (13 – 15)	12 (7 – 14)	13
z3	**30 – 33**	30 (28 – 33)	31 (29 – 34)	28
z4	**12 – 15**	12 (10 – 13)	11 (10 – 14)	9
z5	**6**	6 (5 – 8)	5 (5 – 7)	6
Z4	**105 – 107**	87 (85 – 91)	89 (82 – 94)	79
Z5	**73 – 78**	73 68 – 78)	69 (65 – 72)	72
st1-st1	**55 – 58**	-	-	-
st2-st2	**63 – 66**	58 (55 – 60)	61 (60 – 62)	-
st3-st3	**70 – 73**	-	-	-
st1-st3	**58**	55 (53 – 58)	53 (48 – 55)	-
st4-st4	**88 – 95**	-	-	-
st5-st5	**65**	58 (55 – 61)	61 (58 – 65)	-
Lisl	**25**	-	-	-
Lisw	**3**	-	-	-
Vsl	**98**	77 (65 – 99)	87 (84 – 91)	-
Vsw *ZV2*	**43**	32 (28 – 45)	35 (34 – 36)	-
Vsw *anus*	**55**	39 (35 – 47)	48 (46 – 50)	-
JV5	**44 – 50**	-	-	41
SgeIV	**10 – 15**	8 (8 – 9)	10 (10 – 12)	8
StiIV	**48 – 50**	49 (46 – 52)	49 (48 – 50)	46
StIV	**28 – 30**	27 (24 – 30)	25 (22 – 29)	20
SttIV	**25**	-	-	
Scl	**10**	8 (6 – 10)	4 (2 – 5)	-
Scw	**8**	-	-	-
Fdl	**20 – 23**	21 (20 – 23)	23 (22 – 24)	-
No teeth Fd	**3**	-	3	-
Mdl	**23**	21 (18 – 25)	21 (19 – 22)	-
No teeth Md	**1**	-	1	-

Sources of measurements – Brazil: Souza *et al.* (2015); Guadeloupe: Kreiter & Moraes (1997); Holotype Puerto Rico: Denmark (1966); - : not provided.

Tampon – Bras de Pontho, Aldo Grace farm (aasl 661 m, Long 55°29'48" E, Lat 21°14'33" S), 1 ♀ on *Ageratina riparia* (Regel) R.M.King & H.Rob., 21/2/2017.

Remarks: measurement values s (Table 37) for 2 females of *K. scytinus* from La Réunion Island collected during this study are very similar from those obtained for females from Madagascar in the original description of Chazeau (1970) and from females collected from Burundi and Rwanda (Moraes *et al.* 2008).

Tribe Typhlodromini Wainstein

Typhlodromus Scheuten, Evans 1953: 449.
Typhlodromus (*Typhlodromus*), Chant 1957c: 528.
Typhlodromini Wainstein 1962b: 26; Chant & McMurtry 1994: 246; 2007: 144.

Genus *Typhlodromus* (*Anthoseius*) Scheuten

Typhlodromus (*Anthoseius*) De Leon, van der Merwe 1968: 20; Karg 1982: 194; Chant & McMurtry 1994: 250; 2007: 149.

Typhlodromus (Anthoseius) ndibu Pritchard & Baker

Typhlodromus ndibu Pritchard & Baker 1962: 221.
Amblydromella ndibu, Moraes *et al.* 1986: 168; Denmark & Welbourn 2002.
Typhlodromus (*Anthoseius*) *ndibu*, Moraes *et al.* 2004a: 339; Chant & McMurtry 2007: 155.

Table 36 Character measurements of adult females of *Platyseiella eliahui* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	La Réunion	Zambia	Types South Africa	Characters	La Réunion	Zambia	Types South Africa
	2, this study	2	2		2, this study	2	2
Dsl	**300** (280 – 310)	308	301 (293 – 308)	*st1-st1*	**52** (48 – 55)	-	-
Dsw	**163** (150 – 175)	155 (150 – 160)	158 (154 – 162)	*st2-st2*	**67** (65 – 68)	65	76
j1	**28**	29 (28 – 30)	31	*st3-st3*	**78**	-	-
j3	**25**	30	25 (23 – 26)	*st1-st3*	**63**	65	82
j4	**8**	9 (8 – 10)	10 (8 – 11)	*st4-st4*	**85**	-	-
j5	**6**	8	8	*st5-st5*	**68** (67 – 69)	65	69 – 77
j6	**10**	8	8	Lisl	**23**	-	-
J2	**8**	9 (8 – 10)	8	Lisw	**5**	-	-
J5	**8**	9 (8 – 10)	8 – 11	Vsl	**98** (95 – 100)	100	96 (92 – 100)
r3	**39** (38 – 40)	38	41 (39 – 42)	Vsw *ZV2*	**47** (43 – 50)	45	-
R1	**14** (13 – 15)	12	12	Vsw *anus*	**58** (55 – 60)	58 (55 – 60)	57 (54 – 59)
s4	**56** (55 – 57)	53	54 (51 – 57)	*JV5*	**54** (52 – 55)	-	54 – 62
s6	**83** (78 – 88)	76 (75 – 78)	79 (77 – 80)	*SgeIV*	**11** (10 – 13)	-	13 (11 – 14)
z2	**24** (23 – 25)	25	25 (23 – 26)	*StiIV*	**16** (15 – 18)	22 (20 – 23)	15 (11 – 19)
z4	**25**	28	25 (23 – 26)	*StIV*	**33**	36 (33 – 38)	35 (31 – 39)
z5	**7**	8	8	*SttIV*	**29** (28 – 31)	30 (29 – 31)	27 (23 – 31)
Z4	**32** (30 – 33)	35	30 (26 – 34)	Scl	**25** (22 – 28)	18	-
Z5	**74** (68 – 80)	73	86 (77 – 95)	Scw	**2**	-	-
				Fdl	**31** (30 – 33)	25	-
				No teeth Fd	**3**	3	3
				Mdl	**28**	28	-
				No teeth Md	**2**	2	2

Sources of measurements –Zambia: Ueckermann *et al.* (2007); South Africa types (holotype and one paratype ♀): Ueckermann (1992); - : not provided.

This species belongs to the large *rhenanus* species group as setae *S4*, *JV3* and *JV4* are present, the setae on dorsal shield are setiform, approximately equal in length except *Z4*/*Z5*, setae *r3* and *R1* are inserted on lateral integument and setae on dorsal shield in the *z-Z* and *s-S* series shorter than distances between their bases.

In the literature, Pritchard described this species and Baker (1962) from Congo and Rwanda, recorded than from Nigeria (Matthysse and Denmark 1981), from Indonesia (Oomen 1982), from Kenya (El-Banhawy *et al.* 2009) and our specimens are very similar to the original description based on drawings. This species has very original characters.

Surprisingly, no measurements were given in all papers mentioning this species, even the original description. Measurements are given in the table 38 for the first time for the three adult female specimens and for the single adult male specimen.

This species if mentioned for the first time from La Réunion, from primary forest of medium altitude. Its biology is totally unknown.

Specimens examined: 3 ♀♀ + 1 ♂ in total, all measured. Forêt de Bélouve – Gite (aasl 1500m, Long 55°33'36" E, Lat 21°6'0" S), 3 ♀♀ on *C. borbonica*, 28/1/2017; Forêt de Bélouve – Trou de fer (aasl 1300 m, Long 55°33'36" E, Lat 21°2'24" S), 1 ♂ on *A. heterophylla*, 28/1/2017.

Remarks: this species has short subequal setae except *Z5* in females which are around the double length of all other dorsal setae. The ventrianal shield of the female quadrangular, almost square, and as large as wide. Setae *Z5*, *JV5* and the four macrosetae of the leg IV are knobbed (Table 38).

Typhlodromus (*Anthoseius*) *transvaalensis* (Nesbitt)

Kampimodromus transvaalensis Nesbitt 1951: 55.
Neoseiulus transvaalensis, Muma 1961: 295.

Table 37 Character measurements of adult females of *Kuzinellus scytinus* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	La Réunion	Africa	Holotype Madagascar 1	Holotype Madagascar 2
	2, this study	3	1	1
Dsl	**323** (310 – 335)	329 (317 – 341)	320	325
Dsw	**170** (155 – 185)	147 (157 – 184)	163	180
j1	**18**	18	15	17
j3	**18** (15 – 20)	17 (16 – 18)	17	18
j4	**16** (15 – 18)	14 (13 – 16)	15	14
j5	**16** (15 – 18)	13 (11 – 14)	14	13
j6	**18**	15 (14 – 16)	17	17
J2	**23**	19	22	20
J5	**13**	11 (10 – 11)	9	10
r3	**21** (20 – 23)	20 (19 – 21)	23	20
R1	**16** (15 – 18)	15 (14 – 16)	17	16
s4	**25**	21 (19 – 22)	22	21
s6	**25**	23 (22 – 24)	24	25
S2	**28**	26 (24 – 27)	28	25
S4	**30**	26 (26 – 27)	31	28
S5	**20**	18 (16 – 19)	21	21
z2	**16** (15 – 18)	15 (13 – 16)	17	17
z3	**19** (18 – 20)	18 (14 – 21)	20	20
z4	**21** (20 – 23)	18 (16 – 21)	19	20
z5	**16** (15 – 18)	14 (11 – 16)	16	15
z6	**18**	15 (14 – 16)	17	17
Z4	**35**	31 (30 – 32)	34	33
Z5	**56** (55 – 58)	51 (50 – 53)	53	51

Characters	La Réunion	Africa	Holotype Madagascar 1	Holotype Madagascar 2
	2, this study	3	1	1
st1-st1	**48**	-	47	-
st2-st2	**54** (53 – 55)	54 (53 – 56)	55	-
st3-st3	**60**	-	65	60
st1-st3	**63** (60 – 65)	62 (59 – 64)	68	64
st4-st4	**95**	-	-	-
st5-st5	**63**	51 (50 – 53)	54	68
Lisl	**20**	-	-	19
Lisw	**4** (3 – 5)	-	-	2
Sisl	**15** (13 – 18)	-	-	-
Vsl	**113**	107 (106 – 109)	116	116
Vsw *ZV2*	**88 – 90**	89 (86 – 93)	92	91
Vsw *anus*	**80**	73 (72 – 74)	103	-
JV5	**38** (35 – 40)	-	-	34
StIV	**33** (30 – 35)	31 (27 – 35)	35	35
Scl	**32** (33 – 35)	41 (35 – 46)	-	39
Scw	**7** (5 – 8)	-	-	
Fdl	**28**	25	-	
No teeth Fd	**6**	6	6	6
Mdl	**26** (25 – 28)	27	-	
No teeth Md	**3**	3	3	3

Sources of measurements – Africa (Burundi 1♀, Rwanda 1♀): Moraes *et al.* (2008); Rwanda: Moraes *et al.* (2008); Holotype Madagascar 1: Chazeau (1970); Holotype Madagascar 2: Chant & Yoshida-Shaul (1986); - : not provided.

Clavidromus transvaalensis, Muma & Denmark 1968: 238; Muma & Denmark 1970: 128; Moraes *et al.* 1986: 182.
Typhlodromus transvaalensis, Chant & Baker 1965: 5; Schicha 1981a: 36; Moraes et al. 2004a: 355; Chant & McMurtry 1994: 252, 2007: 157.
Typhlodromus jackmickleyi, De Leon 1958: 75; van Der Merwe 1968: 23 (synonymy according to Muma & Denmark 1968).
Typhlodromus pectinatus, Athias-Henriot 1958a: 179 (synonymy according to Muma & Denmark 1968).

This species has elongate serrated dorsal setae, setae *Z1* and *JV3* absent, an elongate calyx of the spermatheca, leg IV with 3 macrosetae and few teeth on chelicerae. It belongs to the *transvaalensis* species group of the subgenus *Anthoseius* of the genus *Typhlodromus* (Chant and McMurtry 1994).

According to McMurtry *et al.* (2013), *T. transvaalensis* is a type III phytoseiid and a generalist predator that feeds on mites, insects and pollen. It completed its life cycle when fed on the eriophyid mites *Eriophyes dioscoridis* Soliman and Abou-Awad and *Eriophyes olive* Zaher and Abou-Awad, eggs of the scale insect *Parlatoria zizyphus* (Lucas) and pollen of *R. communis* in experimental conditions. The percentage of individuals attaining maturity was less than 20% when nymphs of the tetranychid mite, *T. urticae* Koch, were provided. The development was faster and reproduction was higher when *T. transvaalensis* fed on eriophyid mites. *T. urticae* was an unsuitable feeding and reproduction substrate. The daily reproduction was as low as 0.4 and 0.8 egg/ female/ day when females were maintained on pollen grains of *R. communis* and eggs of *P. zizyphus.* The adult female daily consumed 126, 97 and 6 individuals of *E. olivi, E. dioscoridis* and *T. urticae,* respectively (Momen and Hussein 1999). Adult female *T. transvaalensis* were more efficient at predating all stages of *P. latus* (Banks) than *Tetranychus bastosi* Tuttle, Baker and Sales. The *T. transvaalensis* life cycle was shorter with diets including *R. communis* pollen, but *Zea mays* pollen was also suitable for reproduction. The results indicate that *T. transvaalensis* is a generalist predator with high potential for controlling *P. latus* in *Jatropha curcas* plantations and that the presence of *R. communis* and *Z. mays* crops boosts its development and reproduction (Canarte *et al.* 2017). This species is widely distributed all over the world (Demite *et al.* 2019). It was already recorded from La Réunion in

Table 38 Character measurements of adult females and one adult male of *Typhlodromus* (*Anthoseius*) *ndibu* collected in this study (localities followed by the number of specimens measured between brackets).

Characters	♀ Réunion 3, this study	♂ La Réunion 1, this study
Dsl	**312** (303 – 328)	**263**
Dsw	**203** (200 – 205)	**175**
j1	**15**	**15**
j3	**13** (10 – 15)	**16**
j4	**9** (8 – 10)	**10**
j5	**10**	**12**
j6	**11** (10 – 13)	**13**
J2	**12** (10 – 13)	**15**
J5	**10**	**8**
r3	**15**	**15**
R1	**15**	**14**
s4	**14** (13 – 15)	**18**
s6	**15**	**18**
S2	**15**	**18**
S4	**17** (15 – 18)	**15**
S5	**14** (13 – 15)	**13**

Characters	♀ Réunion 3, this study	♂ La Réunion 1, this study
z2	**13**	**13**
z3	**13**	**15**
z4	**13**	**15**
z5	**10**	**11**
Z4	**14** (13 – 15)	**18**
Z5	**31** (30 – 33) **knob.**	**18 knob.**
st1-st1	**41** (40 – 43)	**40**
st2-st2	**49** (48 – 50)	**53**
st3-st3	**55**	**50**
st1-st3	**61** (53 – 65)	**110**
st4-st4	**56** (55 – 58)	**35**
Gensl	**107** (103 – 110)	Not applicable
Gensw *st5*	**64** (63 – 65)	
Gensw post. corn.	**81** (80 – 83)	
st5-st5	**58**	**30**
Lisl	**20**	Not applicable
Lisw	**7** (5 – 8)	

Characters	♀ Réunion 3, this study	♂ La Réunion 1, this study
Vsl	**111** (110 – 113)	**100**
Vsw *ZV2*	**113** (110 – 115)	**135**
Vsw *anus*	**96** (90 – 100)	**88**
Distance between sol.	**20**	**15**
JV5	**19** (15 – 23) **knob.**	**15 knob.**
SgeIV	**13** (12 – 13) **knob.**	**10 knob.**
StiIV	**12** (12 – 13) **knob.**	**13 knob.**
StIV	**23** (23 – 24) **knob.**	**16 knob.**
SttIV	**21** (20 – 23) **knob.**	**15 knob.**
Scl	**8**	Not applicable
Scw	**5**	
Fdl	**23** (20 – 25)	**18**
No teeth Fd	**8**	**-**
Mdl	**24** (23 – 25)	**23**
No teeth Md	**3**	**-**
Shaft	Not applicable	**13**

Sources of measurements – No measurements are available in the whole literature; - : not provided.

previous surveys (Quilici *et al.* 2000). If all details of collections were provided in the previous paper, measurements of specimens collected and identified were not given. Measurements of specimens collected during this study are provided in table 39.

Specimens examined: 70 ♀♀ + 4 im. in total, 20 ♀♀ measured. Saint-Paul – Savannah (aasl 61 m, Long 55°29'43" E, Lat 21°20'41" S), 5 ♀♀ in *Frankliniothrips* sp. rearings, 16/6/2015; Petite Île – Les bas, Doris Morel farm (aasl 230 m, long 55°34'1" E, lat 21°21'22" S), 1 ♀ on *P. lanceolata*, 31/5/2016; Saint-Pierre – Bassin-Plat CIRAD Research Station (aasl 153 m, Long 55°29'18" E, Lat 21°19'25" S), 1 ♀ in plot CC, 16/8/2016; 1 ♀ in plot BM, 23/8/2016; Petite Île – Piton Bloc, Yébo Luguy farm (aasl 973 m, Long 55°34'64" E, Lat 21°18'64" S), 1 ♀ on *B. catharticus*, 18/10/2016; Saint-Pierre – Ligne Paradis, La Coccinelle Inc. (aasl 164 m, Long 55°28'59" E, Lat 21°18'55" S), 22 ♀♀ + 3 im. in rearings of beneficial insects, 22/2/2017; 4 ♀♀ in rearings of beneficial insects, 11/6/2017; 32 ♀♀ in rearings of beneficial insects, 1/8/2017; 3 ♀♀ + 1 im. in rearings of beneficial insects, 11/8/2017.

Remarks: all measurement values (Table 39) agree well with those already published on this species with only very slight variations. Measurement values of female specimens of La Réunion are very similar with values for specimens of Kenya and South Africa. Despite the large number of females collected, sometimes from a single location, we did not find any males in our study, suggesting that this predatory mite can reproduce through thelytokous parthenogenesis, as observed by Kishimoto (2015).

Conclusion

Before this 10th paper, the fauna of Phytoseiidae of La Réunion Island was limited to 33 recorded species including 24 Amblyseiinae, 5 Phytoseiinae and 4 Typhlodrominae, among which 8 species that had been described as new.

This paper reports on results of surveys done recently (2015-2018) and add 19 newly recorded species among which 3 are new to Science and 21 already known species but with additional data. The number of species for La Réunion Island now reached to 52 among which 11 have been described only from this Island (*P. haroldi* was found in Mauritius recently).

Among these 19 species newly recorded, at least nine are already well known as biological control agents (BCA). This must be underlined as new regulations on importation of macro-organisms are proposed in a lot of countries and specifically for countries like France that have very far over-sea territories. Therefore, it is impossible to import and of course to sell and use exotic species if they are not indigenous in La Réunion Island that is considered as a territory. An importation permit must be requested, but it is expensive and chances to obtain are generally very low (Kreiter *et al.* 2016). The knowledge of the biodiversity, especially of efficient biological control agents from overseas territories, not only for fundamental biodiversity knowledge or conversation purposes but also for agricultural and economical ones, is so of a considerable importance.

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Table 39 Character measurements of adult females of *Typhlodromus* (*Anthoseius*) *transvaalensis* collected in this study with those in previous studies (localities followed by the number of specimens measured).

Characters	La Réunion	Africa	Egypt	Japan	New Caledonia	South Africa	Taiwan	Holotype
	20, this study	9	5	10	**1**	52	2	**South Africa**, 1
Dsl	**362** (343 – 395)	352 (325 – 373)	365 (335 – 407)	389 (383 – 395)	356	356 – 367	331	-
Dsw	**211** (200 – 223)	210 (188 – 232)	192 (170 – 219)	253 (251 – 255)	179	215 – 230	173	-
j1	**28** (25 – 33)	28 (25 – 30)	30 (27 – 33)	33 (33 – 34)	29	29 – 33	26	23
j3	**39** (35 – 43)	38 (36 – 40)	41 (38 – 48)	43 (42 – 43)	39	37 – 42	35	36
j4	**31** (28 – 36)	30 (26 – 33)	32 (30 – 37)	31 (31 – 32)	28	29 – 33	28	27
j5	**32** (30 – 35)	30 (26 – 33)	31 (30 – 36)	32 (32 – 33)	30	29 – 33	26	28
j6	**39** (35 – 45)	38 (35 – 41)	38 (36 – 42)	39 (38 – 39)	34	37 – 42	34	36
J2	**46** (40 – 50)	44 (40 – 46)	44 (41 – 51)	46 (45 – 46)	43	45 – 48	34	45
J5	**10** (8 – 13)	9 (9 – 10)	11 (7 – 14)	11	10	11 – 13	10	10
r3	**35** (33 – 38)	32 (29 – 35)	34 (31 – 37)	38 (37 – 38)	36	34	26	34
R1	**43** (40 – 48)	40 (38 – 41)	41 (39 – 44)	43 (42 – 43)	40	39 – 43	36	45
s4	**46** (40 – 50)	45 (42 – 49)	49 (43 – 56)	50 (49 – 50)	45	45 – 48	41	45
s6	**50** (45 – 53)	49 (46 – 54)	50 (47 – 54)	50 (49 – 51)	43	47 – 52	46	45
S2	**56** (53 – 60)	55 (50 – 57)	50 (49 – 64)	56	55	52 – 56	50	71
S4	**58** (55 – 63)	56 (53 – 56)	54 (50 – 60)	57 (57 – 58)	51	56 – 59	50	58
S5	**7** (5 – 10)	9 (8 – 11)	11 (10 – 11)	8 (8 – 9)	9	11 – 13	6	5
z2	**25** (23 – 28)	24 (21 – 28)	26 (24 – 33)	26 (25 – 26)	21	23 – 26	22	21
z3	**40** (35 – 43)	38 (36 – 40)	41 (37 – 48)	40	36	35 – 40	36	36
z4	**41** (38 – 45)	41 (39 – 41)	45 (40 – 55)	45 (45 – 46)	42	37 – 42	41	42
z5	**28** (25 – 30)	22 (21 – 28)	28 (25 – 37)	29 (28 – 29)	24	25 – 29	24	27
Z4	**58** (53 – 60)	52 (47 – 60)	56 (53 – 63)	56 (55 – 56)	51	52 – 57	53	56
Z5	**65** (58 – 70)	62 (57 – 70)	64 (60 – 71)	67 (66 – 68)	64	62 – 68	56	63
st1-st1	**61** (58 – 65)	-	62 (61 – 65)	-	-	-	-	-
st2-st2	**66** (64 – 69)	60 (54 – 60)	65 (62 – 73)	-	-	63 – 68	-	-
st3-st3	**75** (70 – 80)	-	75 (70 – 83)	-	75	-	-	-
st1-st3	**71** (68 – 75)	68 (65 – 70)	-	-	69	92 – 100	-	-
st4-st4	**95** (78 – 115)	-	85 (78 – 88)	-	-	-	-	-
st5-st5	**78** (73 – 85)	74 (67 – 80)	82 (78 – 90)	-	-	78 – 84	-	-
Lisl	**30** (23 – 35)	-	-	-	29	-	24	-
Lisw	**3** (3 – 5)	-	-	-	-	-	3	-
Sisl	**12** (8 – 18)	-	-	-	12	-	9	-
Vsl	**124** (115 – 133)	118 (107 – 130)	112 (82 – 131)	136 (133 – 138)	111	112 – 120	106	111
Vsw *ZV2*	**80** (73 – 88)	76 (73 – 78)	79 (73 – 85)	83 (83 – 84)	84	74 – 81	65	79
Vsw *anus*	**82** (75 – 88)	78 (73 – 84)	87 (71 – 130)	-	-	-	-	-
JV5	**58** (50 – 63)	-	63 (60 – 65)	60 (60 – 61)	57	-	-	60
Scl	**19** (8 – 28)	19 (13 – 30)	10 (9 – 10)	-	27	-	-	-
Scw	**8** (5 – 10)	-	-	-	3	-	-	-
SgeIV	**26** (23 – 28)	26 (25 – 26)	26 (24 – 28)	27	25	24 – 27	22	20
StiIV	**28** (25 – 30)	27 (24 – 29)	28 (27 – 34)	28	26	27 – 30	26	27
StIV	**47** (43 – 50)	46 (40 – 50)	48 (45 – 51)	48 (48 – 49)	44	45 – 48	58	45
Fdl	**29** (25 – 30)	28 (26 – 30)	31 (30 – 32)	-	28	30	-	-
No teeth Fd	**2**	2	2	3	2	-	-	-
Mdl	**29** (25 – 33)	30 (30 – 31)	31 (30 – 31)	-	29	30	-	-
No teeth Md	**1**	1	1	1	1	-	-	-

Sources of measurements – Africa (Kenya 2♀♀, Cape Verde 1♀, South Africa 6♀♀): Ueckermann *et al.* (2008); Egypt: Abo-Shnaf & Moraes (2014); Japan: Ehara & Kishimoto (2007); South Africa (identified as *T. jackmickleyi* but synonymized by Denmark & Muma 1968): van der Merwe (1968); Taiwan: Tseng (1983); Holotype South Africa and New Caledonia: Schicha (1981a); - : not provided.

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